# DRAFT ENVIRONMENTAL ASSESSMENT FOR THE ISSUANCE OF INCIDENTAL HARASSMENT AUTHORIZATIONS FOR THE TAKE OF MARINE MAMMALS BY HARASSMENT INCIDENTAL TO CONDUCTING SEISMIC, GEOPHYSICAL, AND TEST DRILLING OPERATIONS IN COOK INLET, ALASKA

**LEAD AGENCY:**
U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

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**LOCATION:**
Cook Inlet, Alaska.

**ABSTRACT:**
National Marine Fisheries Service proposes to issue Incidental Harassment Authorizations (IHAs) to SAExploration, Inc. (SAE), ExxonMobil Alaska LNG LLC (EMALL), and BlueCrest Alaska Operating LLC (BlueCrest) for the take of marine mammals incidental to conducting seismic, test drilling, and geophysical activities in the Cook Inlet, Alaska.

**DATE:**
February 2016

**TABLE OF CONTENTS**

## LIST OF ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| 3D | three dimensional |
| ADF&G | Alaska Department of Fish and Game |
| ADCCE | Alaska Department of Commerce, Community, and Economic |
| ADNR | Alaska Department of Natural Resources |
| EMALL | ExxonMobil Alaska LNG LLC |
| AKRO | Alaska Regional Office |
| ANO | Alaska Native Organization |
| Apache | Apache Alaska Corporation |
| Authorization | Incidental Harassment Authorization |
| BOEM | Bureau of Ocean Energy Management |
| CEQ | Council on Environmental Quality |
| CFR | Code of Federal Regulations |
| CIMMC | Cook Inlet Marine Mammal Council |
| cui | cubic inches |
| dB re 1 µPa | decibel referenced to one microPascal |
| EA | Environmental Assessment |
| EFH | Essential Fish Habitat |
| EIS | Environmental Impact Statement |
| ESA | Endangered Species Act |
| EZ | Exclusion Zone |
| FONSI | Finding of No Significant Impact |
| ft | feet |
| FR | Federal Register |
| Hz | Hertz |
| JBER | Joint Base Elmendorf-Fort Richardson |
| KABATA | Knik Arm Bridge and Toll Authority |
| km | kilometer |
| $km^2$ | square kilometer |
| LOA | Letters of Authorization |
| m | meter |
| mi | miles |
| $mi^2$ | square miles |
| $m^3$/sec | cubic meters per second |
| MHHW | Mean Higher High Water |
| MMPA | Marine Mammal Protection Act |
| NAO | NOAA Administrative Order |
| NEPA | National Environmental Policy Act |

| | |
|---|---|
| NMFS | National Marine Fisheries Service |
| NMML | National Marine Mammal Laboratory |
| NOAA | National Oceanic and Atmospheric Administration |
| OMB | Office of Management and Budget |
| OPR | Office of Protected Resources |
| PAM | Passive Acoustic Monitoring |
| PR1 | Permits, Conservation and Educational Division |
| PRD | Protected Resources Division |
| PSO | Protected Species Observer |
| rms | root-mean-squared |
| SAE | SAExploration Inc. |

# Chapter 1 Introduction and Purpose and Need

## 1.1. Description of Proposed Action

The Marine Mammal Protection Act of 1972, as amended (MMPA; 16 U.S.C. 1631 *et seq.*) prohibits the incidental taking of marine mammals. The incidental take of a marine mammal falls under three categories: mortality, serious injury, or harassment, which includes injury and behavioral effects. The MMPA defines harassment as any act of pursuit, torment, or annoyance which: (1) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment); or (2) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).

There are exceptions, however, to the MMPA's prohibition on take. The National Marine Fisheries Service, Office of Protected Resources, Permits and Conservation Division (NMFS, hereinafter, we) may authorize the incidental taking of small numbers of marine mammals by harassment upon the request of a U.S. citizen provided we follow certain statutory and regulatory procedures and make determinations. We discuss this exception in more detail in section 1.2.

In response to requests from SAExploration Inc. (SAE), ExxonMobil Alaska LNG LLC (EMALL), and BlueCrest Alaska Operating LLC (BlueCrest), we propose to issue Incidental Harassment Authorizations (Authorizations) under section 101(a)(5)(D) of the MMPA, which would allow take of small numbers of marine mammals, incidental to the conduct of seismic, test drilling, and geophysical operations in Cook Inlet, Alaska. We do not have the authority to permit, authorize, or prohibit SAE, BlueCrest, or EMALL's proposed operations under section 101(a)(5)(D) of the MMPA, as that authority lies with a different agency.

Our issuance of IHAs to SAE, BlueCrest, and EMALL would be a major federal action under the National Environmental Policy Act (NEPA), the Council on Environmental Quality (CEQ) regulations in 40 CFR §§ 1500-1508, and NOAA Administrative Order (NAO) 216-6. Thus, we are required to analyze the effects on the human environment and determine whether they are significant. NMFS has taken the approach of analyzing these activities in one NEPA document to better analyze cumulative effects and lay out the activities in space and time in a way that is meaningful for the agency and the public.

This Draft Environmental Assessment (EA), titled "*Issuance of Incidental Harassment Authorizations for the Take of Marine Mammals by Harassment Incidental to Conducting Seismic, Test Drilling, and Geophysical Activities in the Cook Inlet, Alaska*," (hereinafter, Draft EA) addresses the potential environmental impacts of two alternatives available to us under section 101(a)(5)(A) of the MMPA, namely:

- Issue Authorizations to SAE, BlueCrest, and EMALL for Level B harassment take of marine mammals under the MMPA during their operations, taking into account the prescribed means of take, mitigation measures, and monitoring requirements required in the proposed Authorizations;
- Not issue Authorizations to SAE, BlueCrest, and EMALL, in which case we assume that the SAE, BlueCrest, and EMALL would either not proceed with the proposed activities or proceed in the absence of an Authorization. For our purposes, we carry forward this alternative assuming the applicants would proceed with activities in the absence of an Authorization.

### 1.1.1. Background on MMPA Applications

In response to public comments received on several previous proposed authorizations, on October 14, 2014, NMFS released a Notice of Intent to Prepare an Environmental Impact Statement on the Issuance of Take Authorizations in Cook Inlet, Alaska (79 FR 61616). While this EIS is in preparation, NMFS committed to taking a more comprehensive approach to NEPA analyses of the MMPA actions known to occur in Cook Inlet in the 2016 operating season. By doing so, NMFS will examine the individual actions being Authorized in Cook Inlet in one NEPA analysis and better examine cumulative effects of these actions occurring in the same year in a relatively small body of water. To do so, NMFS requested that applicants provide their application for IHAs by October 2015 so that enough time was allocated to analyze the actions jointly under NEPA (80 FR 48299). NMFS received the following applications:

- EMALL proposes to conduct a geophysical and geotechnical survey in Cook Inlet, Alaska, for one open water season beginning in March 2016. The activity would occur for approximately sixteen weeks with 102 operational days. EMALL has proposed to survey three areas of 795 $km^2$, 79$km^2$, and 109$km^2$, with the primary objective to explore for and develop a suitable pipeline corridor route across Cook Inlet. Acoustic stimuli generated by a sub-bottom profiler chirp and boomer, vibracore, as well as a seismic airgun have the potential cause behavioral disturbances to marine mammals in the proposed project area.
- SAE proposes to conduct a 3D seismic survey in Cook Inlet, Alaska, for one open water season beginning in March 2016. The activity would occur for approximately 250 days. SAE has proposed to survey two area with areas of 2,126$km^2$ and 1,740$km^2$ with the primary objective to obtain marine offshore data by mapping the subsurface and its geological structure for oil and gas pockets. SAE will not survey more than 777$km^2$ in each of the two areas proposed. Acoustic stimuli generated by a 1760$in^3$ airgun array have the potential cause behavioral disturbances to marine mammals in the proposed project area.
- BlueCrest proposes to conduct an oil and gas drilling program in lower Cook Inlet, Alaska, drilling up to three wells for a total operation time of about 135 days. The drilling would take place at BlueCrest's Cosmopolitan State site in the Lower Inlet. Acoustic stimuli generated by rig towing, pipe driving, and vertical seismic profiling have the potential cause behavioral disturbances to marine mammals in the proposed project area.

### 1.1.2. Marine Mammals in the Action Area

There are several resident species of marine mammals that may occur in any of the project areas from the three applications received by NMFS. The species under our jurisdiction which could be adversely affected by any of the three activities are:

- Cook Inlet beluga whale (*Delphinapterus leucas*)
- Harbor seal (*Phoca vitulina richardsi*)
- Killer whale (*Orcinus orca*)
- Harbor porpoise (*Phocoena phocoena*)

In addition, the species that could be adversely affected by the projects proposed by SAE and BlueCrest are:

- Humpback whale (*Megaptera noveangliae*)
- Steller sea lion (*Eumetopias jubatus*)

Only the activity proposed by SAE could adversely affect the following marine mammal species under our jurisdiction:

- Dall's porpoise (*Phocoenoides dalli*)
- Minke whale (*Balaenoptera acutorostra*)
- Gray whale (*Eschrichtius robustus*)

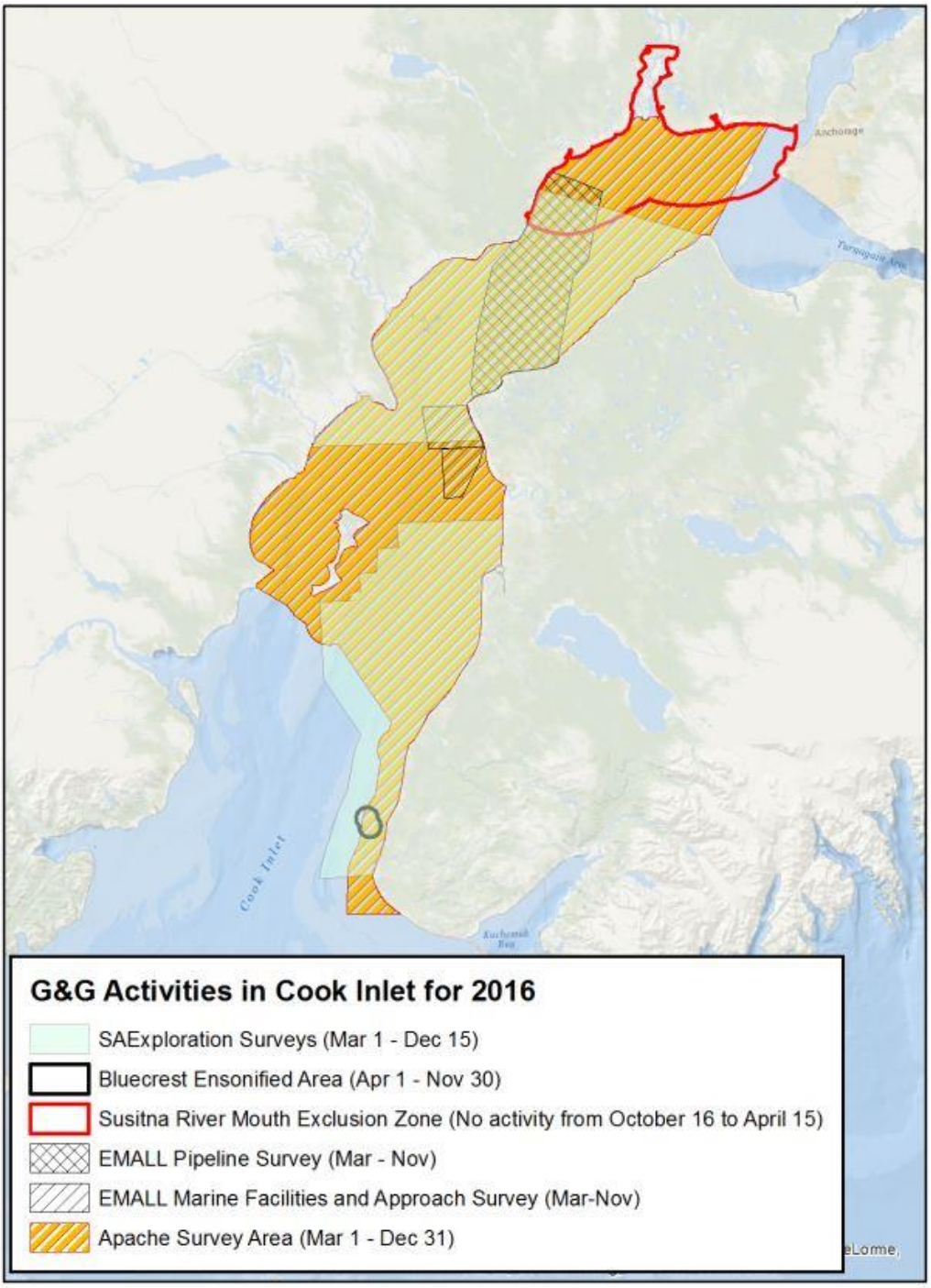
### 1.2. Purpose and Need

The MMPA prohibits "takes" of marine mammals, with a number of specific exceptions. The applicable exception in this case is an authorization for incidental take of marine mammals in section 101(a)(5)(D) of the MMPA.

Section 101(a)(5)(D) of the MMPA directs the Secretary of Commerce (Secretary) to authorize, upon request, the incidental, but not intentional, taking of small numbers of marine mammals of a species or population stock, by United States citizens who engage in a specified activity (other than commercial fishing) within a specified geographical region if we make certain findings and an Authorization is issued.

We have issued regulations to implement the Incidental Take Authorization provisions of the MMPA (50 CFR Part 216) and have produced Office of Management and Budget (OMB)-approved application instructions (OMB Number 0648-0151) that prescribe the procedures necessary to apply for authorizations. All applicants must comply with the regulations at 50 CFR § 216.104 and submit applications requesting incidental take according to the provisions of the MMPA.

**Purpose**: The primary purpose of our proposed action – the issuance of Authorizations to EMALL, SAE, and BlueCrest – is to authorize the take of marine mammals incidental to EMALL, SAE, and BlueCrest's proposed activities with associated requirements for mitigation, monitoring, and reporting. The Authorizations, if issued, would exempt EMALL, SAE, and BlueCrest from the take prohibitions contained in the MMPA. NMFS will consider these three proposed activities jointly under NEPA to better analyze cumulative effects and determine the impacts of these overlapping activities on Cook Inlet and the marine mammals species in the area. We have geospatially presented the oil and gas survey activities that are proposed to occur in Cook Inlet in 2016 (including the three evaluated in this draft EA) in the following figure:


G&G Activities in Cook Inlet for 2016
SAExploration Surveys (Mar 1 - Dec 15)
Bluecrest Ensonified Area (Apr 1 - Nov 30)
Susitna River Mouth Exclusion Zone (No activity from October 16 to April 15)
EMALL Pipeline Survey (Mar - Nov)
EMALL Marine Facilities and Approach Survey (Mar-Nov)
Apache Survey Area (Mar 1 - Dec 31)
Anchorage
Cook Inlet

To authorize the take of small numbers of marine mammals in accordance with section 101(a)(5)(D) of the MMPA, we must evaluate the best available scientific information to determine whether the take would have a negligible impact on marine mammals or stocks and would not have an unmitigable adverse impact on the availability of affected marine mammal species for certain subsistence uses.

In addition, we must prescribe, where applicable, the permissible methods of taking and other means of effecting the least practicable adverse impact on the species or stocks of marine mammals and their habitat (i.e., mitigation), paying particular attention to rookeries, mating grounds, and other areas of similar significance, and on the availability of the species or stocks of marine mammals for subsistence uses. Authorizations must also include requirements or conditions pertaining to the monitoring and reporting of such taking.

**Need**: EMALL, SAE, and BlueCrest submitted applications demonstrating both the need and potential eligibility for issuance of Authorizations for the activities described in section 1.1.1. in response to an FR notice published by NMFS (80 FR 48299). We now have a corresponding duty to determine whether and how we can authorize take by Level B harassment incidental to the activities described in EMALL, SAE, and BlueCrest's applications. Our responsibilities under section 101(a)(5)(D) of the MMPA and its implementing regulations establish and frame the need for this proposed action.

Any alternatives considered under NEPA must meet the agency's statutory and regulatory requirements. Our described purpose and need guide us in developing reasonable alternatives for consideration, including alternative means of mitigating potential adverse effects.

## 1.3 Environmental Review Process

In accordance with the Council on Environmental Quality (CEQ) Regulations and Agency policies for implementing the National Environmental Policy Act (NEPA), NMFS integrates the requirements of NEPA with other regulatory processes required by law or by agency practice so that all processes run concurrently, rather than consecutively. This includes coordination with other National Oceanic Atmospheric Administration (NOAA) offices (e.g., Office of the National Marine Sanctuaries and with other regulatory agencies (e.g., the U.S. Fish and Wildlife Service), as appropriate, during NEPA reviews prior to implementation of a proposed action to ensure that requirements are met. Regarding the issuance of authorizations, we rely substantially on the public process required by the MMPA for preparing proposed authorizations to develop and evaluate relevant environmental information and provide a meaningful opportunity for public participation when we prepare corresponding NEPA documents. We fully consider public comments received in response to the publication of proposed authorizations during the corresponding NEPA review process.

### 1.3.1 Scoping and Public Involvement

In the case of an EIS, the typical initial step to involve the public in the NEPA process is to prepare a Notice of Intent (NOI) to develop an EIS. The NOI is published in the Federal Register (FR) and provides an overview of the proposed action and the scope of the analysis. This process also informs the "scope" of issues to be addressed in the proposed NEPA document and can be used to identify significant issues related to a proposed action. In this case, NMFS determined that providing the Draft EA for public review with the publication of the proposed IHAs was the appropriate step to involve the public in order to understand the public concerns for the proposed action and its environmental impacts, identify significant issues and obtain the necessary information to complete an analysis.

On February 5, 2016, we published the proposed IHA with our preliminary determinations (81 FR 6376) for EMALL. The notice includes a detailed description of the proposed action resulting from the MMPA consultation process; consideration of environmental issues and impacts of relevance related to the issuance of the IHA; and proposed mitigation and monitoring measures to avoid and minimize potential adverse impacts to marine mammal species or stocks and their habitat.

The proposed IHAs for SAE and BlueCrest are on track to be published in the Federal Register following the close of the comment period for the EMALL proposed IHA and will provide the same information that is provided for EMALL.

The notices of the proposed IHAs, the Draft EA and the corresponding public comment period are instrumental in providing the public with information on relevant environmental issues and offering the public a meaningful opportunity to provide comments for our consideration in both the MMPA and NEPA decision-making processes. At the conclusion the environmental review process, we will post the final EA, and, if appropriate, a Finding of No Significant Impact on our website at: http://www.nmfs.noaa.gov/pr/permits/incidental.htm#applications.

## 1.4 Other Environmental Laws or Consultations

NMFS must comply with all applicable federal environmental laws, regulations, and Executive Orders (E.O.s) necessary to implement a proposed action. This may include, but is not limited to, those listed in Table 1. NMFS evaluation of and compliance with environmental laws, regulations and E.O.s is based on the nature and location of the applicants proposed activities and NMFS proposed action. Therefore, this section only summarizes environmental laws and consultation requirements potentially applicable to NMFS' issuance of IHAs to EMALL, SAE, and Bluecrest.

**Table 1 Example Environmental Laws, Regulations or Executive Orders**

| | |
|---|---|
| • Coastal Zone Management Act<br>• Endangered Species Act<br>• Magnuson-Stevens Fishery Conservation and Management Act<br>• Migratory Bird Treaty Act<br>• National Historic Preservation Act<br>• National Marine Sanctuaries Act<br>• E.O. 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations | • E.O. 12962 Recreational Fisheries<br>• E.O. 13045 Protection of Children from Environmental Health Risks and Safety Risks<br>• E.O. 13089 Coral Reef Protection<br>• E.O. 13158 Marine Protected Areas<br>• E.O. 13175 Consultation and Coordination with Indian Tribal Governments |

### 1.4.1 Endangered Species Act

The Endangered Species Act (ESA) established protection over and conservation of threatened and endangered species (T&E) and the ecosystems upon which they depend. An endangered species is a species in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become endangered within the near future throughout all or in a significant portion of its range. The U.S. Fish and Wildlife Service (USFWS) and NMFS jointly administer the ESA and are responsible for the listing of species (designating a species as either threatened or endangered) and designating geographic areas as critical habitat for (T&E) species. The ESA generally prohibits the "take" of an ESA-listed species unless an exception or exemption applies. The term "take" as defined in section 3 of the ESA means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Section 7(a)(2) requires each federal agency to ensure that any action it authorizes, funds or carries out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species. When a federal agency's action may affect a listed species, that agency is required to consult

with NMFS and/or the USFWS under procedures set out in 50 CFR Part 402. NMFS and USFWS can also be action agencies under section 7. Informal consultation is sufficient for species the action agency determines are not likely to be adversely affected if NMFS or USFWS concurs with the action agency's findings, including any additional measures mutually agreed upon as necessary and sufficient to avoid adverse impacts to listed species and/or designated critical habitat.

NMFS issuance of an IHA is a federal action that is subject to the requirements of section 7 of the ESA. As a result, we are required to ensure that the issuance of an IHA to EMALL, SAE and BlueCrest are not likely to jeopardize the continued existence of any T&E species or result in the destruction or adverse modification of critical habitat for these species. There are three marine mammal species under NMFS' jurisdiction listed as endangered under the ESA with confirmed or possible occurrence in the proposed project areas (i.e., Cook Inlet): the Cook Inlet beluga whale, Central North Pacific humpback whale, and Steller sea lion. NMFS' Permits and Conservation Division initiated consultation with NMFS' Alaska Regional Protected Resources Division under section 7 of the ESA on the issuance of IHAs to EMALL, SAE, and BlueCrest. Consultation will be concluded prior to a determination on the issuance of the IHAs.

### 1.4.2 Magnuson-Stevens Fishery Conservation and Management Act

Under the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), Federal agencies are required to consult with the Secretary of Commerce with respect to any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency which may adversely affect essential fish habitat (EFH) identified under the MSFCMA. Although EFH was identified in Cook Inlet for walleye Pollock, rock sole, Pacific cod, skate, weathervane scallop, Pacific salmon, and sculpin, we do not anticipate NMFS' proposed action of authorizing harassment of marine mammals and the associated mitigation and monitoring to impact EFH; therefore, an EFH consultation was not conducted.

## 1.5 Document Scope

This Draft EA was prepared in accordance with NEPA (42 USC 4321, et seq.), CEQ Regulations (40 CFR 1500-1508) and NAO 216-6. The analysis in this draft EA addresses potential impacts to the human environment and natural resources, specifically marine mammals and their habitat, resulting from NMFS proposed action to authorize incidental takes associated with EMALL, SAE and BlueCrest proposed oil and gas exploration activities. This includes the assessment of direct, indirect, and cumulative impacts related to authorizing incidental take of marine mammals under the MMPA. The scope of our analysis is limited to the decision for which we are responsible (i.e. whether or not to issue the IHA). Therefore, this draft EA is intended to provide focused information on the primary issues and impacts of environmental concern, which is our issuance of the IHAs authorizing the take of marine mammals and the mitigation and monitoring measures to minimize the effects of that take. For these reasons, this EA does not provide a detailed evaluation of the effects to the elements of the human environment listed in Table 2 below.

**Table 2 Components of the human environment not requiring further evaluation**

| Biological | Physical | Socioeconomic / Cultural |
|---|---|---|
| Amphibians | Air Quality | Commercial Fishing |
| Humans | Essential Fish Habitat | Military Activities |
| Non-Indigenous Species | Geography | |
| | Land Use | Recreational Fishing |
| | Oceanography | Shipping and Boating |

| | | |
|---|---|---|
| | State Marine Protected Areas | National Historic Preservation Sites |
| | Federal Marine Protected Areas | National Trails and Nationwide Inventory of Rivers |
| | National Estuarine Research Reserves | Low Income Populations |
| | National Marine Sanctuaries | Minority Populations |
| | Park Land | American Indian Religious Freedom Act |
| | Prime Farmlands | Indigenous Cultural Resources |
| | Wetlands | |
| | Wild and Scenic Rivers | Public Health and Safety |
| | Ecologically Critical Areas | Historic and Cultural Resources |
| | Districts, Sites, and Highways | |

### 1.5.1 Other Sources that Influence the Scope of this Assessment

Previous analyses under NEPA, MMPA, and ESA that considered the impacts of NMFS issuance of IHAs in the Cook Inlet area for oil and gas exploration activities, listed in Table 3, is incorporated by reference, as applicable, within the analysis of this Draft EA. Each of these analyses concluded that the issuance of IHAs for oil and gas exploration activities, specifically incidental take, result in negligible impacts to the protected species identified by NMFS as most likely to be present. In addition to previous assessments, we also rely on and incorporate by reference, the applications and other documentation we received from EMALL, SAE and BlueCrest.

**Table 3 Other Sources**

| Source | Document Type |
|---|---|
| NMFS | Proposed IHA for EMALL (81 FR 6376; Feb 5, 2016) |
| EMALL | Application for Incidental Harassment Authorization for the Non-Lethal Harassment of Cetaceans and Pinnipeds: Alaska LNG Project 2016 Geophysical & Geotechnical Program in the Waters of Cook Inlet (EMALL, 2016) |
| EMALL | BIOLOGICAL ASSESSMENT 2016 GEOPHYSICAL & GEOTECHNICAL PROGRAM IN THE WATERS OF COOK INLET (EMALL, 2016); |
| NMFS | Proposed IHA for SAE (80 FR 14913, March 20, 2015) |
| SAE | Application for the Incidental Harassment Authorization for the Taking of Marine Mammals in Conjunction with SAE's Proposed 3D Seismic Surveys in Cook Inlet, Alaska 2016 (Owl Ridge, 2016); |
| SAE | Biological Assessment for SAExploration, Inc. Cook Inlet 3D Seismic Program Cook Inlet, Alaska (Fairweather Science, 2016) |
| NMFS | Proposed IHA for BlueCrest (79 FR 54398, September 11, 2014) |
| BlueCrest | Application for the Incidental Harassment Authorization for the Taking of Non-listed Marine Mammals in Conjunction with the Bluecrest Alaska Operating LLC Activities at Cosmopolitan State Unit, Alaska, 2016 (Owl Ridge Natural Resource Consultants, Inc., 2016). |
| NMFS | Final Supplemental Environmental Impact Statement—Cook Inlet Beluga Whale Harvest (NMFS, 2008a) |
| NMFS | Final Conservation Plan for the Cook Inlet beluga whale (Delphinapterus leucas) (NMFS, 2008b) |

# Chapter 2 Alternatives

## 2.1. Introduction

The NEPA and the implementing CEQ regulations (40 CFR §§ 1500-1508) require consideration of alternatives to proposed major federal actions, and NAO 216-6 provides agency policy and guidance on the consideration of alternatives to our proposed action. An EA must consider all reasonable alternatives, including the No Action Alternative. This provides a baseline analysis against which we can compare the other alternatives.

To warrant detailed evaluation as a reasonable alternative, an alternative must meet our purpose and need. In this case, as we previously explained, an alternative meets our purpose and need if it satisfies the requirements under section 101(a)(5)(D) the MMPA. We evaluated each potential alternative against these criteria; identifiedone action alternative along with the No Action Alternative; and carried these forward for evaluation in this EA.

As described in Section 1.2, the MMPA requires that we must prescribe the means of effecting the least practicable impact on the species or stocks of marine mammals and their habitat. In order to do so, we must consider SAE , EMALL, and BlueCrest's proposed mitigation measures, as well as other potential measures, and assess how such measures could minimize impacts on the affected species or stocks and their habitat. Our evaluation of potential measures includes consideration of the following factors in relation to one another: (1) the manner in which, and the degree to which, we expect the successful implementation of the measure to minimize adverse impacts to marine mammals; (2) the proven or likely efficacy of the specific measure to minimize adverse impacts as planned; and (3) the practicability of the measure for applicant implementation.

Any additional mitigation measure proposed by us beyond what the applicant proposes should be able to or have a reasonable likelihood of accomplishing or contributing to the accomplishment of one or more of the following goals:

- Avoidance or minimization of marine mammal injury, serious injury, or death, wherever possible;
- A reduction in the numbers of marine mammals taken (total number or number at biologically important time or location);
- A reduction in the number of times the activity takes individual marine mammals (total number or number at biologically important time or location);
- A reduction in the intensity of the anticipated takes (either total number or number at biologically important time or location);
- Avoidance or minimization of adverse effects to marine mammal habitat, paying special attention to the food base; activities that block or limit passage to or from biologically important areas; permanent destruction of habitat; or temporary destruction/disturbance of habitat during a biologically important time; and
- For monitoring directly related to mitigation, an increase in the probability of detecting marine mammals, thus allowing for more effective implementation of the mitigation.

Alternative 1 includes a suite of mitigation measures intended to minimize potentially adverse impacts on affected marine mammal species or stocks. This chapter describes the alternatives and compares them in terms of their environmental impacts and their achievement of objectives. Two alternatives are carried through full analyses, while a third alternative with cutting edge and somewhat untested and unproven technologies was not carried through due to impracticability and unknown effectiveness.

## 2.2. Description of EMALL's Proposed Activities

We present a general overview of EMALL's proposed geophysical and geotechnical survey program operations in our proposed IHA *Federal Register* notice. We briefly summarize here.

### 2.2.1. Specified Time and Specified Area

EMALL proposes to operate in Cook Inlet offshore waters for approximately sixteen weeks in open water periods beginning in March 2016. The proposed survey includes 102 days of operations including use of a sub-bottom profiler chirp and boomer, 60in$^3$ array airgun, and vibracore. The chirp will be used concurrently with the boomer or the airgun array.

The proposed location of EMALL's activity encompasses three distinct offshore areas. A portion of EMALL's intended survey area is located in northern Cook Inlet near the Susitna Delta region. EMALL will only operate in this portion of Critical Habitat Area 1 outside of the exclusion zone determined by NMFS (April 15-October 15). There are numerous factors that influence the survey areas, including the geology of the Cook Inlet area, other permitting restrictions (i.e., commercial fishing, Alaska Department of Fish and Game refuges), overlap of sources and receivers to obtain the necessary imaging data, and general operational restrictions (ice, weather, environmental conditions, marine life activity, etc.).

EMALL proposes to use two source vessels for the sub-bottom profiler/airgun, one for shallower operations and one for deeper operations. The source vessel would be equipped with one 60 cubic inch (in$^3$) airgun, as well as a sub-bottom profiler chirp and boomer. This portion of the operation would utilize two source vessels (only one in use at a time), a vessel jack-up platform, and a tug. A separate vessel will be used for vibracoring. A stationary airgun will also be used at times.

## 2.3. Description of SAE's Proposed Activities

We will present a general overview of SAE's proposed 3D seismic survey program operations in our proposed IHA *Federal Register* notice. We briefly summarize here.

### 2.3.1. Specified Time and Specified Area

SAE proposes to operate in Cook Inlet offshore waters for approximately eight to nine months in open water periods from March through December 2016. During each 24-hour period, seismic support activities may be conducted throughout the entire period; however, in-water airguns would only be active for approximately 2-3 hours during each of the slack tide periods. There are approximately four slack tide periods in a 24-hour period; therefore, airgun operations would be active during approximately 8-12 hours per day, if weather conditions allow.

The proposed location of SAE's acquisition plan encompasses two specific areas totaling approximately 3,943 km$^2$ (1,522 mi$^2$) of offshore areas, although SAE plans to only survey a portion of this total project area not totaling more than 777km$^2$ of surveying in each region. A portion of SAE's intended survey

area is located in northern Cook Inlet near the Susitna Delta region. SAE would only operate in a small portion of this Delta, near the southern border of beluga Critical Habitat Area 1. There are numerous factors that influence the survey areas, including the geology of the Cook Inlet area, other permitting restrictions (i.e., commercial fishing, Alaska Department of Fish and Game refuges), seismic imaging of leases held by other entities with whom SAE has agreements (e.g., data sharing), overlap of sources and receivers to obtain the necessary seismic imaging data, and general operational restrictions (ice, weather, environmental conditions, marine life activity, etc.). Water depths for the program range from 0-128 m (0-420 ft).

#### 2.3.2. Seismic Survey Operations

During seismic survey operations, vessels would lay and retrieve nodal sensors on the sea floor in periods of low current over a 24-hour period. SAE proposes to use two synchronized vessels. Each source vessel would be equipped with compressors and 880 cubic inch ($in^3$) airgun arrays. Additionally, one of the source vessels would be equipped with a 440 $in^3$ shallow water source array. The two source vessels do not fire the airguns simultaneously; rather, each vessel fires a shot every 16 seconds, leaving 8 seconds between shots. Vessel speeds range from four to five knots. The operation would utilize two source vessels, three cable/nodal deployment and retrieval operations vessels, a mitigation/monitoring vessel, a crew transport vessel, and two bow picker vessels.

### 2.4. Description of BlueCrest's Proposed Activities

We will present a general overview of BlueCrest's proposed drilling program operations in our proposed IHA *Federal Register* notice. We briefly summarize here.

#### 2.4.1. Specified Time and Specified Area

Bluecrest proposes to conduct the one well exploratory drilling program during the 2015 open water season (approximately April 15 through October 31). Bluecrest estimates that the drilling period could extend up to 90 days, including up to 15 days of well testing. During this time period, conductor pipe driving would only occur for a period of 1 to 3 days (although actual sound generation would occur only intermittently during this time period), and vertical seismic profiling (VSP) operations would only occur for a period of less than 1 to 2 days. Mobilization and demobilization rig tows are estimated to take less than 24 hours

Bluecrest's proposed program would occur at Cosmopolitan State #B-1 (originally Cosmopolitan #2) in lower Cook Inlet, AK, approximately seven miles north of Anchor Point. The exact well location is latitude 59º 52' 13.887" N., 151º 52' 17.225'' W. in water depth of 61 ft and is only a few miles from shore.

#### 2.4.2. Exploratory Drilling Operations

Bluecrest proposes to conduct exploratory drilling operations of up to three test wells at a site in lower Cook Inlet during the 2016 open water (ice-free) season (i.e., April through October), using a jack-up drill rig.. The rig would be towed to the drilling site by ocean-going tugs. The activities of relevance to this analysis include: mobilization and demobilization of the drill rig to and from the well location at the start and end of the season; driving of the conductor pipe; exploratory drilling; and VSP operations. Bluecrest

proposes to utilize both helicopters and vessels to conduct resupply, crew change, and other logistics during the exploratory drilling program. The jack-up drilling rig's drilling platform and other noise-generating equipment is located above the sea's surface, and there is very little surface contact with the water compared to drill ships and semi-submersible drill rigs; therefore, lattice-legged jack-up drill rigs are relatively quiet (Richardson et al., 1995a; Spence et al., 2007).

A conductor pipe is a relatively short, large-diameter pipe driven into the sediment prior to the drilling of oil wells. This section of tubing serves to support the initial sedimentary part of the well, preventing the looser surface layer from collapsing and obstructing the wellbore. The pipe also facilitates the return of cuttings from the drill head. Conductor pipes are usually installed using drilling, pile driving, or a combination of these techniques. In offshore wells, the conductor pipe is also used as a foundation for the wellhead. Bluecrest proposes to drive approximately 200 ft (60 m) below mudline of 30-inch conductor pipe at Cosmopolitan State #B-1 prior to drilling using a Delmar D62-22 impact hammer. This hammer has impact weight of 13,640 pounds (6,200 kg) and reaches a maximum impact energy of 165,215 foot-pounds (224 kilonewton-meters) at a drop height of 12 ft (3.6 m).

Once a well is drilled, accurate follow-up seismic data can be collected by placing a receiver at known depths in the borehole and shooting a seismic airgun at the surface near the borehole. The gathered data provide not only high resolution images of the geological layers penetrated by the borehole but can be used to accurately correlate (or correct) the original surface seismic data. The procedure is known as VSP. Bluecrest intends to conduct VSP operations at the end of drilling the well using an array of airguns with total volumes of between 600 and 880 cubic inches ($in^3$). The VSP operation is expected to last less than one or two days. Additional details on the components of the exploratory drilling program can be found in the application (Owl Ridge Natural Resource Consultants, Inc., 2015).

## 2.5. Description of Alternatives

### 2.5.1. Alternative 1 – Issuance of Authorizations with Mitigation Measures

The Proposed Actions constitute Alternative 1 and this is the Preferred Alternative. Under this alternative, we would issue Authorizations to EMALL, SAE, and BlueCrest, allowing the incidental take, by Level B harassment of specified marine mammals species subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the proposed IHAs, if issued, along with any modifications based on consideration of public comments.

All Applicants submitted Marine Mammal Monitoring and Mitigation Plans (4MPs) along with their IHA applications. These 4MPs include proposed mitigation and monitoring measures that satisfy the MMPA IHA application requirements.

#### 2.5.1.1. Proposed Mitigation Measures for EMALL and SAE

To reduce the potential for disturbance from acoustic stimuli associated with the activities, EMALL has proposed to implement several monitoring and mitigation measures for marine mammals. NMFS has proposed some additional measures. The measures are largely the same for the EMALL and SAE proposed activities because both actions involve moving sound sources. BlueCrest's activity is stationary drilling. The proposed monitoring and mitigation measures include:

(1) Utilize NMFS-qualified, vessel-based Protected Species Observers (PSOs) to visually watch for and monitor marine mammals near the source vessels during daytime operations (from nautical twilight-dawn to nautical twilight-dusk) and before and during start-ups of sound sources day or night. Two PSOs would be on each source vessel, and two PSOs would be on the support vessel to observe the exclusion and disturbance zones. When practicable, as an additional means of visual observation, EMALL's vessel crew may also assist in detecting marine mammals.
(2) Establish a relevant 120 dB or160 dB re 1 µPa (rms) "disturbance zone" and a 180 dB re 1 µPa (rms) and 190 dB re 1 µPa (rms) "exclusion zone" (EZ) for marine mammals before the vibracore, airgun, or sub-bottom profiler is in operation. EMALL must also establish a 160 dB re 1 µPa (rms) zone for belugas and groups of five or more harbor porpoises and killer whales before the sound sources mentioned above are in operation.
(3) Visually observe the entire extent of the EZ (180 dB re 1 µPa [rms] for cetaceans and 190 dB re 1 µPa [rms] for pinnipeds and the 160 dB re 1 µPa [rms] for belugas and groups of five or more harbor porpoises and killer whales) using NMFS-qualified PSOs, for at least 30 minutes (min) prior to starting the sound sources as well as 30 minutes after the cessation of active sound sources. If the PSO finds a marine mammal within the EZ, EMALL must delay the survey until the marine mammal(s) has left the area. If the PSO sees a marine mammal that surfaces, then dives below the surface, the PSO shall wait 30 min. If the PSO sees no marine mammals during that time, they should assume that the animal has moved beyond the EZ. If for any reason the entire radius cannot be seen for the entire 30 min (i.e., rough seas, fog, darkness), or if marine mammals are near, approaching, or in the EZ, the sound sources may not be started up.
(4) Alter speed or course during operations if a marine mammal, based on its position and relative motion, appears likely to enter the relevant EZ. If speed or course alteration is not safe or practicable, or if after alteration the marine mammal still appears likely to enter the EZ, further mitigation measures, such as a shutdown, shall be taken.
(5) Shutdown the sound source(s) if a marine mammal is detected within, approaches, or enters the relevant EZ. A shutdown means all operating sound sources are shut down (i.e., turned off).
(6) Following a shutdown and subsequent animal departure, survey operations may resume following procedures described above.
(7) Marine geophysical surveys may continue into night and low-light hours if such segment(s) of the survey is initiated when the entire relevant EZs can be effectively monitored visually (i.e., PSO(s) must be able to see the extent of the entire relevant EZ).
(8) No initiation of survey operations involving the use of sound sources is permitted from a shutdown position at night or during low-light hours (such as in dense fog or heavy rain).
(9) If a beluga whale or groups of five or more killer whales and/or harbor porpoises are visually sighted approaching or within the 160-dB disturbance zone, survey activity would not commence until the animals are no longer present within the 160-dB disturbance zone.
(10) Whenever beluga whales or groups of five or more killer whales and/or harbor porpoises are detected approaching or within the 160-dB disturbance zone, the sound sources shall be shut-down until the animals are no longer present within the 160-dB zone.
(11) Survey operations involving the use of vibracore, air guns, and sub-bottom profiler chirp and boomers must cease if authorized numbers of takes of any marine mammal are met or exceeded.

In addition to the mitigation measures proposed by EMALL, we have proposed additional mitigation measures for EMALL due to the additional equipment used in their surveys. These measures are as follows:

(1) Suspending operations if a live marine mammal stranding is reported in Cook Inlet coincident to, or within 72 hours of activities involving the use of vibracore, airguns, or sub-bottom profiler. The shutdown must occur if the animal is within a distance two times that of the 160 dB isopleth of the sound source. Shutdown procedures will remain in effect until NMFS determines that, and advises EMALL that, all live animals involved in the stranding have left the area (either of their own volition or following herding by responders).
(2) EMALL must not operate any of the above-mentioned technologies within 10 miles (16 km) of the mean higher high water (MHHW) line of the Susitna Delta (Beluga River to the Little Susitna River) between April 15 and October 15 (to avoid any effects to belugas in an important feeding and breeding area).
(3) If any marine mammal species are encountered during activities for which take is not authorized are likely to be exposed to sound pressure levels (SPLs) greater than or equal to 160 dB re 1 µPa (rms), then EMALL must alter speed or course, power down or shut-down the sound source to avoid take.
(4) EMALL must use a NMFS-approved passive acoustic monitoring scheme in order to conduct operations at night. PAM must be used to listen to the area for 30 minutes for vocalizations. If no vocalizations are detected, EMALL may commence operations.

#### 2.5.1.2. Proposed Mitigation Measures for BlueCrest

To reduce the potential for disturbance from acoustic stimuli associated with the activities, Bluecrest has proposed to implement several monitoring and mitigation measures for marine mammals. These mitigation and monitoring measures differ from those of SAE and EMALL because many of the sound sources used in BlueCrest's work are stationary. NMFS has proposed some additional measures. The proposed monitoring and mitigation measures include:

(1) Utilize a sufficient number of vessel-based Protected Species Observers (PSOs) to visually watch for and monitor marine mammals near the drill rig during daytime operations (from nautical twilight-dawn to nautical twilight-dusk). Bluecrest shall not conduct nighttime operations (nautical twilight dusk to nautical twilight dawn). PSOs shall have access to reticle binoculars, big-eye binoculars, and night vision devices. PSO shifts shall last no longer than 4 hours at a time. PSOs shall also make observations during daytime periods when the sound sources are not operating for comparison of animal abundance and behavior, when feasible. When practicable, as an additional means of visual observation, drill rig or vessel crew may also assist in detecting marine mammals. Within safe limits, the PSOs should be stationed where they have the best possible viewing. PSOs should be instructed to identify animals as unknown where appropriate rather than strive to identify a species if there is significant uncertainty.
(2) Conductor Pipe Driving Mitigation:
    a. PSOs will observe from the drill rig during impact hammering out to the 160 dB re 1 µPa (rms) radius of 1.6 km (1 mi). If marine mammal species for which take is not authorized are about to enter this zone, then use of the impact hammer will cease.
    b. If cetaceans for which take is authorized approach or enter within the 180 dB re 1 µPa (rms) radius of 250 m (820 ft) or if pinnipeds for which take is authorized approach or

enter within the 190 dB re 1 µPa (rms) radius of 60 m (200 ft), then use of the impact hammer will cease. Following a shutdown of impact hammering activities, the applicable zones must be clear of marine mammals for at least 30 minutes prior to restarting activities.

c. PSOs will visually monitor out to the 160 dB re 1 µPa (rms) radius for at least 30 minutes prior to the initiation of activities. If no marine mammals are detected during that time, then Bluecrest can initiate impact hammering using a "soft start" technique. Hammering will begin with an initial set of three strikes at 40 percent energy followed by a 1 min waiting period, then two subsequent three-strike sets. This "soft-start" procedure will be implemented anytime impact hammering has ceased for 30 minutes or more. Impact hammer "soft-start" will not be required if the hammering downtime is for less than 30 minutes and visual surveys are continued throughout the silent period, and no marine mammals are observed in the applicable zones during that time.

(3) VSP Airgun Mitigation:

a. PSOs will observe from the drill rig during airgun operations out to the 160 dB re 1 µPa (rms) radius of 2.5 km (1.55 mi). If marine mammal species for which take is not authorized are about to enter this zone, then use of the airguns will cease.

b. If cetaceans for which take is authorized approach or enter within the 180 dB re 1 µPa (rms) radius of 240 m (787 ft) or if pinnipeds for which take is authorized approach or enter within the 190 dB re 1 µPa (rms) radius of 120 m (394 ft), then use of the airguns will cease. Following a shutdown of airgun operations, the applicable zones must be clear of marine mammals for at least 30 minutes prior to restarting activities.

c. PSOs will visually monitor out to the 160 dB re 1 µPa (rms) radius for at least 30 minutes prior to the initiation of activities. If no marine mammals are detected during that time, then Bluecrest can initiate airgun operations using a "ramp-up" technique. Airgun operations will begin with the firing of a single airgun, which will be the smallest gun in the array in terms of energy output (dB) and volume ($in^3$). Operators will then continue ramp-up by gradually activating additional airguns over a period of at least 30 minutes (but not longer than 40 minutes) until the desired operating level of the airgun array is obtained. This ramp-up procedure will be implemented anytime airguns have not been fired for 30 minutes or more. Airgun ramp-up will not be required if the airguns have been off for less than 30 minutes and visual surveys are continued throughout the silent period, and no marine mammals are observed in the applicable zones during that time.

(4) No initiation of survey operations involving the use of sound sources is permitted from a shutdown position during low-light hours (such as in dense fog or heavy rain).

In addition to the mitigation measures proposed by Bluecrest, we have proposed additional mitigation measures:

(1) If any marine mammal species for which take is not authorized are encountered during exploratory drilling operations and are likely to be exposed to sound pressure levels (SPLs) greater than or equal to 160 dB re 1 µPa (rms) for impulse sources or greater than or equal to 120 dB re 1 µPa (rms), then Bluecrest must shut-down the sound source prior to the animal entering the applicable Level B isopleth to avoid take.

(2) During rig towing operations, speed will be reduced to 8 knots or less, as safety allows, at the approach of any whales or Steller sea lions within 2,000 ft (610 m) of the towing operations.
(3) Helicopters must maintain an altitude of at least 1,000 ft (305 m), except during takeoffs, landings, or emergency situations.
(4) Live Stranding Event Mitigation:
    a. Should Bluecrest become aware of a live stranding event (from NMFS or another source), Bluecrest must immediately implement a shutdown of the airgun array.
        i. A shutdown must be implemented whenever the animal is within 5 km of the seismic airguns.
        ii. Shutdown procedures will remain in effect until NMFS determines that, and advises Bluecrest that, all live animals involved in the stranding have left the area (either of their own volition or following herding by responders).
    b. Within 48 hours of the notification of the live stranding event, Bluecrest must inform NMFS where and when they were operating airguns and at what discharge volumes.
    c. Bluecrest must appoint a contact who can be reached 24/7 for notification of live stranding events. Immediately upon notification of the live stranding event, this person must order the immediate shutdown of the airguns.

**PROPOSED MONITORING AND REPORTING MEASURES ACROSS ALL APPLICANTS**

In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by these Authorizations, such as an injury (Level A harassment), serious injury or mortality (e.g., ship-strike, gear interaction, and/or entanglement), all applicants shall immediately cease the specified activities and immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, her designees, and the Alaska Regional Stranding Coordinators. The report must include the following information:

(1) Time, date, and location (latitude/longitude) of the incident;
(2) The name and type of vessel involved;
(3) The vessel's speed during and leading up to the incident;
(4) Description of the incident;
(5) Status of all sound source use in the 24 hours preceding the incident;
(6) Water depth;
(7) Environmental conditions (e.g., wind speed and direction, Beaufort sea state, cloud cover, and visibility);
(8) Description of marine mammal observations in the 24 hours preceding the incident;
(9) Species identification or description of the animal(s) involved;
(10) The fate of the animal(s); and
(11) Photographs or video footage of the animal (if equipment is available).

Activities shall not resume until NMFS is able to review the circumstances of the prohibited take. NMFS shall work with the applicants to determine what is necessary to minimize the likelihood of further prohibited take and ensure MMPA compliance. Applicants may not resume their activities until notified by NMFS via letter or email, or telephone.

In the event that an applicant discovers an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition as described in the next paragraph), applicants would immediately report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, her designees, and the NMFS Alaska Stranding Hotline. The report must include the same information identified in the paragraph above. Activities may continue while NMFS reviews the circumstances of the incident. NMFS would work with applicants to determine whether modifications in the activities are appropriate.

In the event that an applicant discovers an injured or dead marine mammal, and the lead PSO determines that the injury or death is not associated with or related to the authorized activities (e.g., previously wounded animal, carcass with moderate to advanced decomposition, or scavenger damage), applicants shall report the incident to the Chief of the Permits and Conservation Division, Office of Protected Resources, NMFS, her designees, the NMFS Alaska Stranding Hotline, and the Alaska Regional Stranding Coordinators within 24 hours of the discovery. Applicants shall provide photographs or video footage (if available) or other documentation of the stranded animal sighting to NMFS and the Marine Mammal Stranding Network. Activities may continue while NMFS reviews the circumstances of the incident.

#### 2.5.1.3. Proposed Monitoring and Reporting for EMALL and SAE

EMALL and SAE would submit a weekly field report to NMFS, no later than close of business each Thursday during the weeks when in-water survey activities take place. The weekly field reports would summarize species detected (number, location, distance from source vessel, behavior), in-water activity occurring at the time of the sighting (sounds sources active and state of operation at time of sighting, visual plots of sightings, and number of power downs and shutdowns), behavioral reactions to in-water activities, and the number of marine mammals exposed. Additionally, EMALL and SAE would submit a monthly report, no later than the 15th of each month, to NMFS' Permits and Conservation Division for all months during which in-water survey activities for which an Authorization is proposed occur. These reports must contain and summarize the following information:

(1) Dates, times, locations, heading, speed, weather, sea conditions (including Beaufort sea state and wind force), and associated activities during all sound source operations and marine mammal sightings;
(2) Species, number, location, distance from the vessel, and behavior of any marine mammals, as well as associated activity (number of shutdowns), observed throughout all monitoring activities;
(3) An estimate of the number (by species) of: (A) pinnipeds that have been exposed to the activity (based on visual observation) at received levels greater than or equal to 160 dB re 1 µPa (rms) and/or 190 dB re 1 µPa (rms) with a discussion of any specific behaviors those individuals exhibited; and (B) cetaceans that have been exposed to the activity (based on visual observation) at received levels greater than or equal to 160 dB re 1 µPa (rms) and/or 180 dB re 1 µPa (rms) with a discussion of any specific behaviors those individuals exhibited; and
(4) A calculation of the area surveyed that week and the corresponding beluga densities as derived from the Goetz et al (2012) model to determine how many belugas may have been taken by Level

B harassment. These calculations from previous weeks must also be included to ensure EMALL has not taken more than 34 beluga whales.

(5) A description of the implementation and effectiveness of the: (A) terms and conditions of the Biological Opinion's Incidental Take Statement (ITS); and (B) mitigation measures of the Authorization. For the Biological Opinion, the report shall confirm the implementation of each Term and Condition, as well as any conservation recommendations, and describe their effectiveness, for minimizing the adverse effects of the action on ESA-listed marine mammals.

#### 2.5.1.4. Proposed Monitoring and Reporting for All Applicants

EMALL, SAE, and BlueCrest would submit an annual report to NMFS' Permits and Conservation Division within 90 days after the end of the operating season. The annual report would include:

(1) Summaries of monitoring effort (e.g., total hours, total distances, and marine mammal distribution through the study period, accounting for sea state and other factors affecting visibility and detectability of marine mammals);
(2) Analyses of the effects of various factors influencing detectability of marine mammals (e.g., sea state, number of observers, and fog/glare);
(3) Species composition, occurrence, and distribution of marine mammal sightings, including date, water depth, numbers, age/size/gender categories (if determinable), group sizes, and ice cover;
(4) Analyses of the effects of survey operations; and
(5) Sighting rates of marine mammals during periods with and without authorized activities (and other variables that could affect detectability), such as: (A) initial sighting distances versus survey activity state; (B) closest point of approach versus survey activity state; (C) observed behaviors and types of movements versus survey activity state; (D) numbers of sightings/individuals seen versus survey activity state; (E) distribution around the source vessels versus survey activity state; and (F) estimates of take by Level B harassment based on presence in the relevant 120dB/160 dB harassment zone.

NMFS would review the draft annual reports. Applicants must then submit a final annual report to the Chief, Permits and Conservation Division, Office of Protected Resources, NMFS, within 30 days after receiving comments from NMFS on the draft annual report. If NMFS decides that the draft annual report needs no comments, the draft report shall be considered to be the final report.

In addition to these formal reports, applicants must immediately report to NMFS if five fewer beluga takes than authorized are cumulatively detected within the relevant 120dB/ 160 dB re 1 µPa (rms) disturbance zone during survey operations to allow NMFS to consider making necessary adjustments to monitoring and mitigation.

Our preliminary assessment is the Preferred Alternative would satisfy the purpose and need of our proposed action under the MMPA–issuance of Authorizations, along with required mitigation measures and monitoring that meets the standards set forth in section 101(a)(5)(D) of the MMPA and the implementing regulations.

### 2.5.2. Alternative 2 – No Action Alternative

We are required to evaluate the No Action Alternative per CEQ NEPA regulations. The No Action Alternative serves as a baseline against which to compare the impacts of the Preferred and other alternatives. Under the No Action Alternative, we would not issue Authorizations to EMALL, SAE, and BlueCrest under the MMPA. The consequences of not authorizing incidental takes are (1) the entity conducting the activity may be in violation of the MMPA if takes do occur, (2) mitigation and monitoring measures cannot be required by NMFS, and (3) mitigation measures might not be performed voluntarily by the applicant. By undertaking measures to further protect marine mammals from incidental take through the authorization program, the impacts of these activities on the marine environment can potentially be lessened. While NMFS does not authorize the proposed activities themselves, NMFS does authorize the unintentional, incidental take of marine mammals (under its jurisdiction) in connection with these activities and prescribes, where applicable, the methods of taking and other means of effecting the least practicable impact on the species and stocks and their habitats. If IHAs are not issued, EMALL, SAE, and BlueCrest would effectively be precluded from engaging in their proposed activities in Cook Inlet in 2016, as any takes of marine mammals under such activities would be violations of the MMPA. Either of these outcomes, no operation or operation without guarantee of mitigation, could occur under the No Action Alternative. Although the No Action Alternative would not meet the purpose and need to allow incidental takings of marine mammals under certain conditions, the CEQ's regulations require consideration and analysis of a No Action Alternative for the purposes of presenting a comparative analysis to the action alternatives.

### 2.5.3. Alternatives Considered but Rejected from Further Consideration

NMFS considered whether other alternatives could meet the purpose and need and support EMALL, SAE, and BlueCrest's proposed activities. These alternatives include:

**Issuance of IHAs with No Required Mitigation, Monitoring, or Reporting Measures**

An alternative that would allow for the issuance of IHAs with no required mitigation or monitoring was considered but eliminated from consideration, as it would not be in compliance with the MMPA and therefore would not meet the purpose and need. For that reason, this alternative is not analyzed further in this document.

**Use of Alternative Technologies**

An alternative that would require EMALL, SAE, and BlueCrest to use alternative technologies to conduct their activities in Cook Inlet was considered but eliminated from further consideration. NMFS is unaware of any alternative techniques currently available that would allow EMALL, SAE, and BlueCrest to conduct the proposed seismic and shallow geohazard surveys in the Cook Inlet. For seismic and geophysical surveying, quieting technologies are not tested in conditions as changing and treacherous as Cook Inlet. Aditionally, NMFS is unaware of alternative technologies for BlueCrest's test well drilling activities.

# Chapter 3 Affected Environment

The National Marine Fisheries Service (NMFS) reviewed all possible environmental, cultural, historical, social, and economic resources based on the geographic location associated with NMFS proposed action and alternatives and each of the applicants request's for an incidental take authorization for the proposed oil and gas exploration activities. Based on this review, this section describes the affected environment and existing (baseline) conditions for select resource categories. As explained in Chapter 1, certain resource categories not affected by NMFS proposed action and alternatives were not carried forward for further consideration or evaluation in this draft EA (See Table 1). Chapter 4 provides an analysis and description of environmental impacts associated with the affected environment.

## 3.1. Physical Environment

As discussed in Chapter 1, our proposed action and alternatives relate only to the authorization of incidental take of marine mammals and not to the physical environment. However, marine mammal habitat is one aspect of the physical environment that is relevant to our proposed action (see Chapter 1, Table 2

### 3.1.1. Marine Mammal Habitat

We present information on marine mammal habitat and the potential impacts to marine mammal habitat in the *Federal Register* notices of the proposed IHAs. In summary, several marine mammal species use the waters of Cook Inlet for foraging, calving, and other important life history functions. The mouths of river streams are important beluga whale feeding habitat. Harbor seals also use coastal haul-outs in Cook Inlet. Killer whales, humpback whales, and Steller sea lions are more commonly use the lower Cook Inlet area, which is included in some of the survey operation area.

Pursuant to the ESA, critical habitat has been designated for Cook Inlet beluga. Two of the proposed actions fall within critical habitat designated in Cook Inlet for beluga whales. On April 11, 2011, NMFS announced he two areas of critical habitat (76 FR 20180) comprising 7,800 $km^2$ (3,013 $mi^2$) of marine habitat (Figure 2). Critical habitat includes two areas (Areas 1 and 2) that encompass 7,800 $km^2$ of marine and estuarine habitat in Cook Inlet[1]. Designated beluga whale Critical Habitat Area 1 consists of 1,909 $km^2$ of Cook Inlet, north of Three Mile Creek and Point Possession. Critical Habitat Area 1 contains shallow tidal flats or mudflats and mouths of rivers that provide important areas for foraging, calving, molting, and escape from predators. High concentrations of beluga whales are often observed in these areas from spring through fall. Additionally, anthropogenic threats have the greatest potential to adversely impact beluga whales and their habitat in Critical Habitat Area 1. Critical Habitat Area 2 consists of 5,891 $km^2$ located south of Critical Habitat Area 1 and includes nearshore areas along western Cook Inlet and Kachemak Bay. Critical Habitat Area 2 is known fall and winter foraging and transit habitat for beluga whales, as well as spring and summer habitat for smaller concentrations of beluga whales. EMALL and SAE's proposed survey areas are in the designated beluga whale Critical Habitat Area 1, although some of the survey area is within the 10 mile seasonal buffer for Critical Habitat 1 described above. These activities are also proposed to occur in the designated beluga whale Critical Habitat Area 2.

[1] For national security reasons, critical habitat excludes all property and waters of JBER and waters adjacent to the Port of Anchorage (Figure 2 Insert).

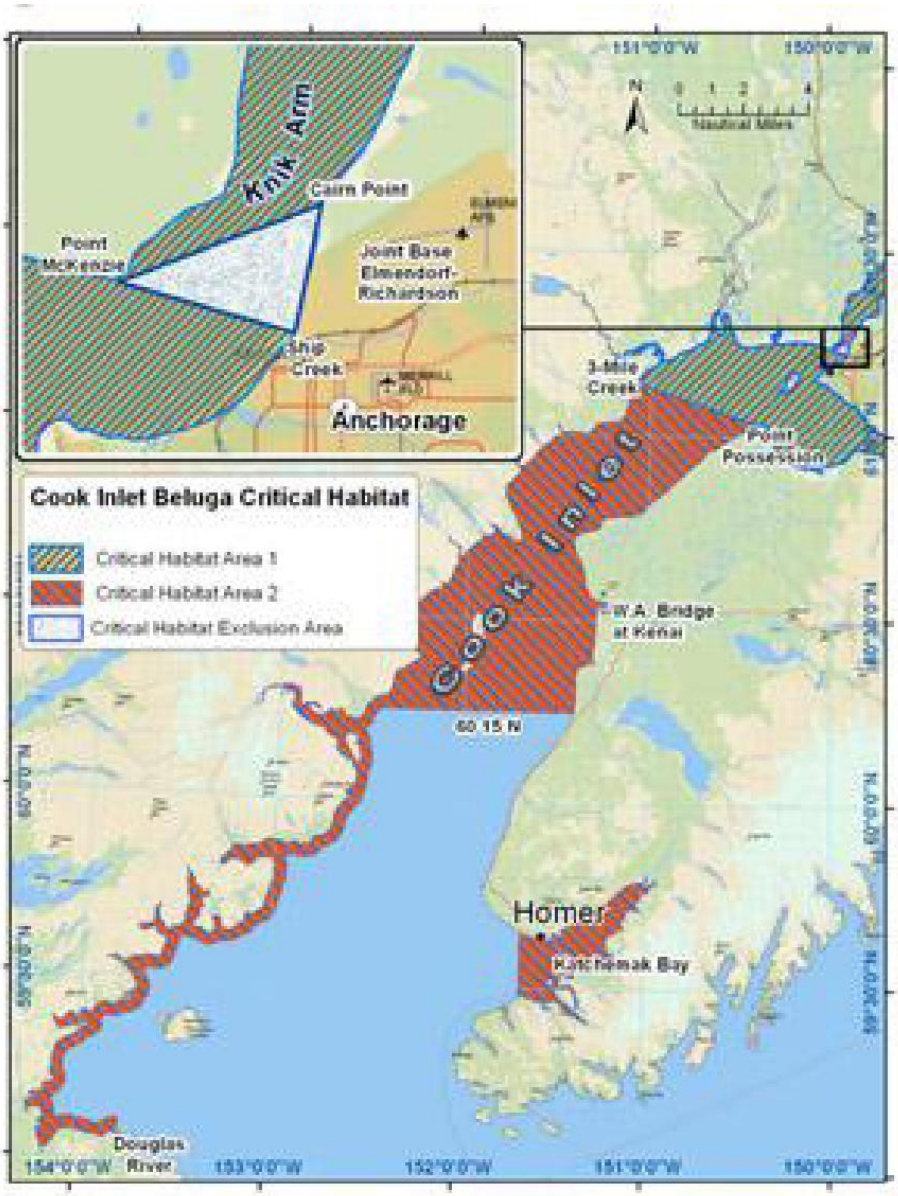



**Figure 2. Final critical habitat of Cook Inlet beluga whales (76 FR 20180, April 11, 2011).**

## 3.2. Biological Environment

### 3.2.1. Marine Mammals

We provide information on the occurrence of marine mammals most likely present in the proposed survey area in section 1.1.2 of this EA. The marine mammals most likely to be harassed incidental to conducting the proposed activities are: Cook Inlet beluga whale, harbor seal, killer whale, harbor porpoise, humpback whale, gray whale, minke whale, Dall's porpoise, and Steller sea lion (Shelden et al. 2003). While killer and gray whales and Steller sea lions have been sighted in upper Cook Inlet, their occurrence is considered rare. Cook Inlet beluga whales, harbor porpoises, and harbor seals are the species most likely to be sighted during the proposed activities. Recent passive acoustic monitoring research has indicated that harbor porpoises occur more frequently in the project area for the three actions than was previously

estimated based solely on visual observations (NMML 2011, personal communication). Table 4 provides a summary of the abundance and status of the species likely to occur in the operation areas of the proposed activities. We will provide information on the distribution, population size, and conservation status for each species in the proposed IHA *Federal Register* notices. We briefly summarize this information here. The proposed IHA *Federal Register* notices, application (Owl Ridge, 2015a,b; EMALL, 2015) and the Biological Assessments will contain detailed information on life history functions, hearing abilities, and distribution, which is also incorporated by reference and briefly summarized below. Table 5 provides information on hearing ranges of marine mammals..

**Table 4. Abundance estimates, conservation status, and population trends of the marine mammal species for which take is proposed to be authorized.**

| Species | Stock | ESA/MMPA status[1]; Strategic (Y/N) | Stock abundance (CV, $N_{min}$, most recent abundance survey)[2] | Relative occurrence in Cook Inlet; season of occurrence |
|---|---|---|---|---|
| Humpback whale | Central North Pacific | E/D;Y | 7,469 (0.095;5,833;2000) | Occasionally seen in Lower Inlet, summer |
| Minke whale | Alaska | -;N | 1,233 (0.034;N/A;2003) | Infrequently occur but reported year-round |
| Gray whale | Eastern North Pacific | -; N | 19,126 (0.071; 18,017; 2007) | Rare migratory visitor; late winter |
| Killer whale | Alaska Resident<br><br>Alaska Transient | -;N<br>-:N | 2,347 (N/A; 2,084; 2009)<br><br>345 (N/A; 303; 2003) | Occasionally sighted in Lowe Cook Inlet |
| Beluga whale | Cook Inlet | E/D;Y | 312 (0.10; 280; 2012) | Use upper Inlet in summer and lower in winter: annual |
| Harbor porpoise | Gulf of Alaska | -;Y | 31,046 (0.214; 25,987; 1998) | Widespread in the Inlet: annual (less in winter) |
| Dall's porpoise | Alaska | | | Infrequently found in Lower Inlet |
| Steller sea lion | Western DPS | E/D;Y | 79,300 (N/A; 45,659; 2012) | Primarily found in lower Inlet |
| Harbor seal | Cook Inlet/Shelikof | -;N | 22,900 (0.053; 21,896; 2006) | Frequently found in upper and lower inlet; annual (more in northern Inlet in summer) |

**Table 5. Classification of marine mammals that could potentially occur in the proposed action areas and for which take is proposed to be authorized (by functional hearing groups) (Southall et al. 2007; NMFS 2013c).**

| | |
|---|---|
| Low Frequency Hearing Range (7 Hz to 30 kHz) | Gray, minke, and humpback whales |
| Mid-Frequency Hearing Range | Killer and beluga whales |

| | |
|---|---|
| (150 Hz to 160 kHz) | |
| High Frequency Hearing Range (200 Hz to 180 kHz) | Dall's and harbor porpoise |
| Phocid in Water Hearing Range (75 Hz to 100 kHz) | Harbor seal |
| Otariid in Water Hearing Range (100 Hz to 40 kHZ) | Steller sea lion |

### 3.2.2. ESA-listed Marine Mammals

**Cook Inlet Beluga Whale**

Beluga whales appear seasonally throughout Alaskan waters, except in the Southeast region and the Aleutian Islands. Five stocks are recognized in Alaska: Beaufort Sea stock, eastern Chukchi Sea stock, eastern Bering Sea stock, Bristol Bay stock, and Cook Inlet stock (Allen and Angliss 2013). The Cook Inlet stock is the most isolated of the five stocks, as it is separated from the others by the Alaska Peninsula and resides year round in Cook Inlet (Laidre et al. 2000). Only the Cook Inlet stock inhabits the proposed survey area.

NMFS began comprehensive, systematic aerial surveys on beluga whales in Cook Inlet in 1994. Unlike previous efforts, these surveys included the upper, middle, and lower inlet. These surveys documented a decline in abundance of nearly 50 percent between 1994 and 1998, from an estimate of 653 to 347 whales (Rugh et al. 2000). In response to this decline, NMFS initiated a status review on the Cook Inlet beluga whale stock pursuant to the MMPA and the ESA in 1998 (63 FR 64228, November 19, 1998). The annual abundance surveys conducted each June since 1999 provide the following abundance estimates: 357 beluga whales in 1999, 435 beluga whales in 2000, 386 beluga whales in 2001, 313 beluga whales in 2002, 357 beluga whales in 2003, 366 beluga whales in 2004, 278 beluga whales in 2005, 302 beluga whales in 2006, 375 beluga whales in 2007; 321 beluga whales in 2009; 340 beluga whales in 2010; 284 whales in 2011; 312 whales in 2012 (Hobbs et al. 2000; Rugh et al. 2003, 2004a, 2004b, 2005a, 2005b, 2005c, 2006, 2007, 2010; NMFS 2010; Hobbs et al. 2011, Shelden et al. 2012). The overall population trend for the past 10 years for Cook Inlet beluga whales shows them not recovering and still in decline at an annual rate of 0.6 percent (http://www.alaskafisheries.noaa.gov/newsreleases/2013/cibelugapop2012.htm).

Figure 3 depicts the distribution of beluga whales in upper Cook Inlet and is based upon NMML data including NMFS aerial surveys. Additional information on beluga whale distribution is known from NMFS data from satellite-tagged belugas, and opportunistic sightings (NMML 2004); baseline studies of beluga whale occurrence in Knik Arm conducted for KABATA (Funk et al. 2005); baseline studies of beluga whale occurrence in Turnagain Arm conducted in preparation for Seward Highway improvements (Markowitz et al. 2007); marine mammal surveys conducted at Ladd Landing to assess a coal shipping project (Prevel Ramos et al. 2008); and marine mammal surveys off Granite Point, the Beluga River, and further down the inlet at North Ninilchik (Brueggeman et al. 2007a, 2007b, 2008).

The collective NMFS aerial survey results show that beluga whales have been consistently found near or in river mouths along the northern shores of upper Cook Inlet (i.e., north of East and West Foreland). In particular, beluga whale groups are seen in the Susitna River Delta, Knik Arm, and along the shores of Chickaloon Bay. Small groups were reported farther south in Kachemak Bay, Redoubt Bay (Big River),

and Trading Bay (McArthur River) prior to 1996, but very rarely thereafter. Since the mid-1990s, most (96 to 100 percent) beluga whales in upper Cook Inlet have been concentrated in shallow areas near river mouths, no longer occurring in the central or southern portions of Cook Inlet (Hobbs et al. 2008). Based on these aerial surveys, the concentration of beluga whales in the northernmost portion of Cook Inlet appears to be fairly consistent from June to October (Rugh et al. 2000, 2004a, 2005a, 2006, 2007; Shelden et al. 2008, 2009, 2010).

Other studies and monitoring programs have revealed additional information about beluga whale distribution in Cook Inlet. Studies for KABATA in 2004 and 2005 confirmed the use of Knik Arm by beluga whales from July to October (Funk et al. 2005). Data from tagged whales (14 tags between July and March 2000 through 2003) show beluga whales use upper Cook Inlet intensively between summer and late autumn (Hobbs et al. 2005). As late as October, beluga whales tagged with satellite transmitters continued to use Knik Arm and Turnagain Arm and Chickaloon Bay, but some ranged into lower Cook Inlet south to Chinitna Bay, Tuxedni Bay, and Trading Bay (McArthur River) in the fall (Hobbs et al. 2005). In November, beluga whales moved between Knik Arm, Turnagain Arm, and Chickaloon Bay, similar to patterns observed in September (Hobbs et al. 2005). By December, beluga whales were distributed throughout the upper to mid-inlet. From January into March, they moved as far south as Kalgin Island and slightly beyond in central offshore waters. Beluga whales also made occasional excursions into Knik Arm and Turnagain Arm in February and March in spite of ice cover greater than 90 percent (Hobbs et al. 2005). While they moved widely around Cook Inlet there was no indication from the tagged whales (Hobbs et al. 2005) that beluga whales had a seasonal migration in and out of Cook Inlet.

Depending upon the season, beluga whales can occur in both offshore and coastal waters. Although they remain in the general Cook Inlet area during the winter, they disperse throughout the upper and mid-inlet areas. Data from NMFS aerial surveys, opportunistic sighting reports, and satellite-tagged beluga whales confirm they are more widely dispersed throughout Cook Inlet during the winter months (November-April), with animals found between Kalgin Island and Point Possession. Based upon monthly surveys (e.g., Rugh et al. 2000), opportunistic sightings, and satellite-tag data, there are generally fewer observations of these whales in the Anchorage and Knik Arm area from November through April (NMML 2004; Rugh et al. 2004a).

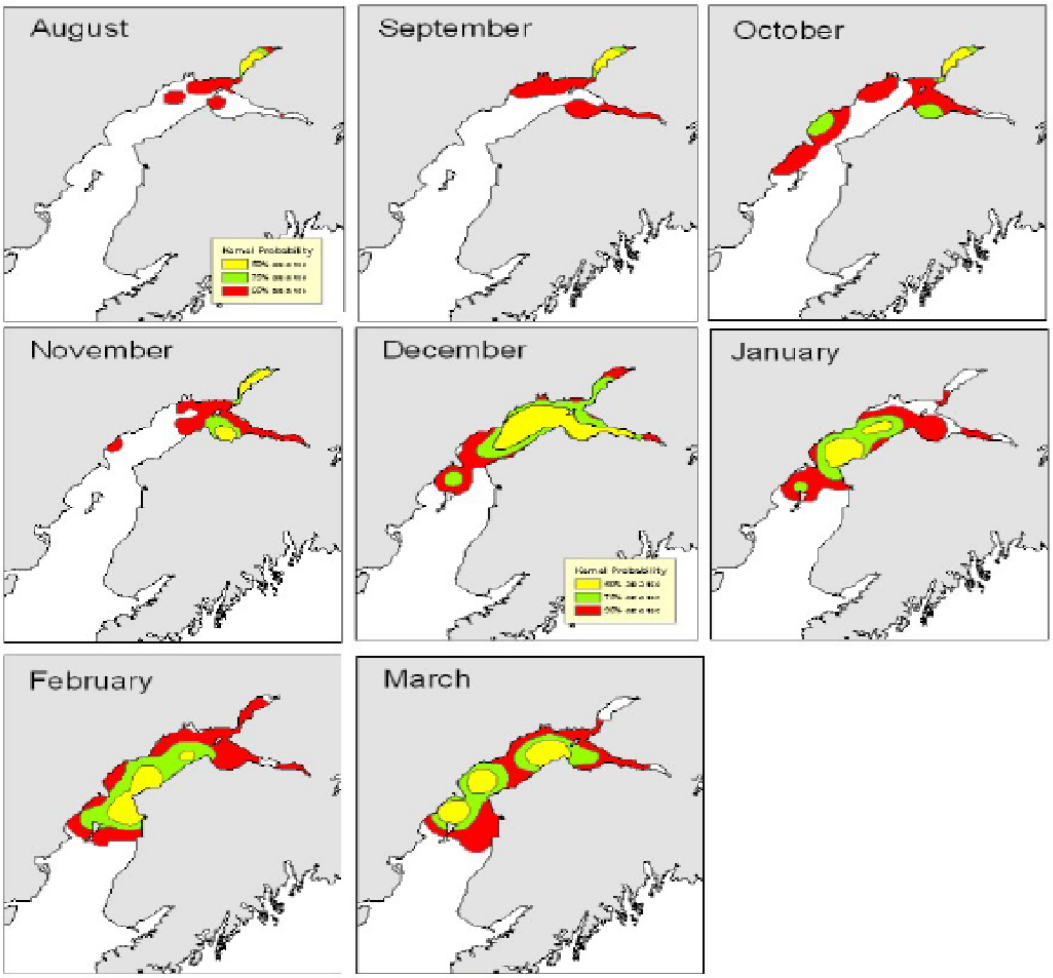



**Figure 3. Predicted beluga distribution by month based upon known locations of 14 satellite tagged belugas (predictions derived via kernel probability estimates; Hobbs et al. 2005). Note the large increase in total area use and offshore locations beginning in December and continuing through March. The red area (95 percent probability) encompasses the green (75 percent) and yellow (50 percent) regions. From NMFS 2008b.**

During the spring and summer, beluga whales are generally concentrated near the warmer waters of river mouths where prey availability is high and predator occurrence is low (Moore et al. 2000). Most beluga whale calving in Cook Inlet occurs from mid-May to mid-July in the vicinity of the river mouths, although Native hunters have described calving as early as April and as late as August (Huntington 2000).

Beluga whale concentrations in upper Cook Inlet during April and May correspond with eulachon migrations to rivers and streams in the northern portion of upper Cook Inlet (NMFS 2003; Angliss and Outlaw 2005). Data from NMFS aerial surveys, opportunistic sightings, and satellite-tagged beluga whales confirm that they are concentrated along the rivers and nearshore areas of upper Cook Inlet (Susitna River Delta, Knik Arm, and Turnagain Arm) from May through October (NMML 2004; Rugh et al. 2004a). Beluga whales are commonly seen from early July to early October at the mouth of Ship Creek where they feed on salmon and other fish, and also in the vicinity of the Port (e.g., alongside docked ships and within 300 ft of the docks) (Blackwell and Greene 2002; NMML 2004). Beluga whales have also

been observed feeding immediately offshore of the tidelands north of the Port and south of Cairn Point (NMFS 2004).

**Steller Sea Lion**

Steller sea lions occur in Cook Inlet but south of Anchor Point around the offshore islands and along the west coast of the upper inlet in the bays (Chinitna Bay, Iniskin Bay, etc.) (Rugh et al. 2005a). Portions of the southern reaches of the lower inlet are designated as critical habitat, including a 20-nautical mile buffer around all major haul out sites and rookeries. Rookeries and haulout sites in lower Cook Inlet include those near the mouth of the inlet, which are far south of the project area. Presence of Steller sea lions in the proposed project areas is anticipated to be low or rare. The western distinct population segment is the one that occurs in the proposed area and is the only one still listed under the ESA.

**Humpback whale**

Humpback whales occur occasionally in Cook Inlet, particularly in the South toward Barren Islands, as the Central North Pacific stock of humpbacks is known to migrate to Alaska for summer feeding. Some of the whales that summer in Alaska have been tagged and known to migrate in winter to Hawaii. NMFS aerial surveys have sighted as many as 47 whales in a single survey period, however they have not sighted more than 10 whales in a survey since 2006 (NMFS, 2012). Humpbacks maintain a seasonal presence in the south of the Inlet, although humpbacks are occasionally sighted as far north as Anchorage in summer months.

### 3.2.3. Non-ESA Listed Marine Mammals

**Harbor Seal**

Harbor seals inhabit the coastal and estuarine waters of Cook Inlet. In general, harbor seals are more abundant in lower Cook Inlet than in upper Cook Inlet, but they do occur in the upper inlet throughout most of the year (Rugh et al. 2005). Harbor seals are non-migratory; their movements are associated with tides, weather, season, food availability, and reproduction. The major haulout sites for harbor seals are located in lower Cook Inlet, and their presence in the upper inlet coincides with seasonal runs of prey species. For example, harbor seals are commonly observed along the Susitna River and other tributaries along upper Cook Inlet during the eulachon and salmon migrations (NMFS, 2003). During aerial surveys of upper Cook Inlet in 2001, 2002, and 2003, harbor seals were observed 24 to 96 km (15 to 60 mi) south-southwest of Anchorage at the Chickaloon, Little Susitna, Susitna, Ivan, McArthur, and Beluga Rivers (Rugh et al., 2005). During a 2D test program in March 2011, two harbor seals were observed by vessel-based PSOs. Harbor seals haul out on rocks, reefs, beaches, and drifting glacial ice, and feed on capelin, eulachon, cod, pollock, flatfish, shrimp, octopus, and squid in marine, estuarine, and occasionally fresh waters.

**Killer Whale**

Numbers of killer whales in Cook Inlet are small compared to the overall population and most are recorded in the lower Cook Inlet. Killer whales are rare in upper Cook Inlet, where transient killer whales are known to feed on beluga whales, and resident killer whales are known to feed on anadromous fish (Shelden et al. 2003). The availability of these prey species largely determines the likeliest times for killer whales to be in the area. Twenty-three sightings of killer whales were reported in the lower Cook Inlet

between 1993 and 2004 in aerial surveys by Rugh et al. (2005a). Surveys over 20 years by Shelden et al. (2003) reported 11 sightings in upper Cook Inlet between Turnagain Arm, Susitna Flats, and Knik Arm. No killer whales were spotted during surveys by Funk et al. (2005), Ireland et al. (2005), Brueggeman et al. (2007a, 2007b, 2008), or Prevel Ramos et al. (2006, 2008). Eleven killer whale strandings have been reported in Turnagain Arm, six in May 1991, and five in August 1993. Very few killer whales, if any, are expected to approach or be in the vicinity of the operation areas.

**Harbor Porpoise**

The most recent estimated density of animals in Cook Inlet is 7.2 per 1,000 $km^2$ (386 $mi^2$) (Dahlheim et al. 2000) indicating that only a small number use Cook Inlet. Harbor porpoise have been reported in lower Cook Inlet from Cape Douglas to the West Foreland, Kachemak Bay, and offshore (Rugh et al. 2005a). Small numbers of harbor porpoises have been consistently reported in the Upper Cook Inlet between April and October, except for a recent survey that recorded higher numbers than typical. Highest monthly counts include 17 harbor porpoises reported for spring through fall 2006 by Prevel Ramos et al. (2008), 14 for spring of 2007 by Brueggeman et al. (2007a), 12 for fall of 2007 by Brueggeman et al. (2008), and 129 for spring through fall in 2007 by Prevel Ramos et al. (2008) between Granite Point and the Susitna River during 2006 and 2007; the reason for the recent spike in numbers (129) of harbor porpoises in the upper Cook Inlet is unclear and quite disparate with results of past surveys, suggesting it may be an anomaly. The spike occurred in July, which was followed by sightings of 79 harbor porpoise in August, 78 in September, and 59 in October in 2007. The number of porpoises counted more than once was unknown. Therefore, because we lack information regarding double counting, it is possible that the actual numbers are smaller than reported. On the other hand, recent passive acoustic research in Cook Inlet by ADF&G and NMML have indicated that harbor porpoises occur more frequently than expected, particularly in the West Foreland area in the spring (NMFS 2011, personal communication), although overall numbers are still unknown at this time. In 2012, Apache marine mammal observers recorded 137 sightings of 190 estimated individuals; a similar count to the 2007 spike previously observed. The increase of sightings in the upper Cook Inlet may reflect movement of harbor porpoise distribution than previously known.

## 3.3. Socioeconomic Environment

### 3.3.1. Subsistence

Near the proposed survey, Tyonek is a Dena'ina Athabascan village practicing a subsistence lifestyle. The Village of Tyonek lies on a bluff on the northwest shore of Cook Inlet and has no interconnected road access. According to Census 2010, there were 144 housing units in the community and 70 were occupied. Its population was 88.3 percent American Indian or Alaska Native; 5.3 percent white; 6.4 percent of the local residents had multi-racial backgrounds (ADCCE 2010).

The principal wild foods harvested and consumed by Dena'ina communities are fish, land mammals (moose), and marine mammals. Salmon consistently provides the major portion of the region's subsistence food, and sockeye is the most harvested. Shellfish, plants, and birds and eggs each make up approximately 2% of the total annual harvest (BOEM 2003).

Native hunters historically have hunted beluga whales and harbor seals for food. The subsistence harvest of beluga transcends nutritional and economic value of the whale as the harvest is an integral part of the cultural identity of the region's Alaska Native communities. Inedible parts of the whale provide Native

artisans with materials for cultural handicrafts, and the hunting perpetuates Native traditions by transmitting traditional skills and knowledge to younger generations. However, due to dramatic declines in the Cook Inlet beluga whale population, on May 21, 1999, legislation was passed to temporarily prohibit (until October 1, 2000) the taking of Cook Inlet belugas under the subsistence harvest exemption in section 101(b) of the MMPA without a cooperative agreement between NMFS and the affected Alaska Native Organizations (ANOs) (Public Law No. 106-31, section 3022, 113 Stat. 57,100). That prohibition was extended indefinitely on December 21, 2000 (Public Law No. 106-553, section 1(a)(2), 114 Stat. 2762). NMFS subsequently entered into six annual co-management agreements (2000-2003, 2005-2006) with the Cook Inlet Marine Mammal Council, an ANO representing Cook Inlet beluga hunters, which allowed for the harvest of 1-2 belugas.

On October 15, 2008, NMFS published a final rule that established long-term harvest limits on Cook Inlet beluga whales that may be taken by Alaska Natives for subsistence purposes (73 FR 60976). That rule prohibits harvest for a 5-year interval period if the average stock abundance of Cook Inlet beluga whales over the prior five-year interval is below 350 whales. Harvest levels for the current 5-year planning interval (2013-2017) are zero because the average stock abundance for the previous five-year period (2008-2012) was below 350 whales. Based on the average abundance over the 2002-2007 period, no hunt occurred between 2008 and 2012 (NMFS, 2008a). The Cook Inlet Marine Mammal Council, which managed the Alaska Native Subsistence fishery with NMFS, was disbanded by a unanimous vote of the Tribes' representatives on June 20, 2012. No harvest occurred in 2015 or is expected in 2016.

Villages in lower Cook Inlet adjacent to EMALL's proposed survey area (Kenai, Salamatof) have either not traditionally hunted beluga whales, or at least not in recent years, and rarely do they harvest sea lions. Between 1992 and 2008, the only reported sea lion harvests from this area were two Steller sea lions taken by hunters from Kenai (Wolfe et al. 2009). These villages more commonly harvest harbor seals, with Kenai reporting an average of about 13 per year between 1992 and 2008 (Wolfe et al. 2008). According to Fall et al. (1984), many of the seals harvested by hunters from these villages were taken on the west side of the inlet during hunting excursions for moose and black bears (or outside SAE's lower Cook unit).

Although marine mammals remain an important subsistence resource in Cook Inlet, the number of animals annually harvested is low, and are primarily harbor seals. Much of the harbor seal harvest occurs incidental to other fishing and hunting activities, and at areas outside of the EMALL's proposed survey areas such as the Susitna Delta or the west side of lower Cook Inlet. Also, EMALL is unlikely to conduct the majority of their survey activity in the vicinity of any of the river mouths where large numbers of seals haul out.

EMALL has identified the following features that are intended to reduce impacts to subsistence users:

- Authorized in-water survey activities will follow mitigation procedures to minimize effects on the behavior of marine mammals and, therefore, opportunities for harvest by Alaska Native communities.

EMALL will meet with the native village of and the Kenaitze tribe to discuss concerns related to the proposed incidental take of marine mammals was raised. Similar meetings will be conducted with Tyonek and Beluga.

SAE has identified the following features that are intended to reduce impacts to subsistence users:

• In-water seismic activities would follow mitigation procedures to minimize effects on the behavior of marine mammals and, therefore, opportunities for harvest by Alaska Native communities;

- Regional subsistence representatives may support recording marine mammal observations along with marine mammal biologists during the monitoring programs and would be provided with annual reports.

Prior to offshore activities SAE will consult with nearby communities including: Nikiski, Ninilchik Native Association Inc., Tyonek Native Corporation,Tyonek Village, Ninilchik,Nikiski Facilities Group, and United Cook Inlet Drift Association.. SAE will present the program description to the different groups listed in Section 3 of their Plan of Cooperation prior to operations within those areas. These meetings will allow SAE to understand community concerns, and requests for communication or mitigation. Additional communications will continue throughout the project. Meetings will also be held with Native Corporation leaders to establish subsistence activities and timelines. Ongoing discussions and meeting with federal and state agencies will occur during the permit process.

# Chapter 4 Environmental Consequences

This chapter of the EA analyzes the impacts of the two alternatives on the human environment. EMALL, SAE, and BlueCrest's applications, our proposed IHAs, and other related environmental analyses listed in Table 1 inform our analysis of the direct, indirect, and cumulative effects of our proposed issuance of Authorizations.

## 4.1. Effects of Alternative 1 – Issuance of Authorizations with Mitigation Measures

Alternative 1 is the Preferred Alternative where we would issue Authorizations to EMALL, SAE, and BlueCrest, allowing the incidental take, by Level B harassment, of four to nine species of marine mammals, depending upon the project, subject to the mandatory mitigation and monitoring measures and reporting requirements set forth in the IHAs (see Section 2.3.1), if issued.

### 4.1.1. Impacts to Marine Mammal Habitat

Our proposed action would have no effect on the physical environment beyond those resulting from the underlying proposed activities. EMALL, SAE, and BlueCrest's proposed survey areas are not located within a national, marine sanctuary, marine protected area, or a National Park. State wildlife conservation areas are designated in Cook Inlet; however, those occur mostly on land with some portions along the coasts and would not be impacted by our proposed action of the issuance of Authorizations to take marine mammals. The proposed activities would minimally add to vessel traffic in the region. The proposed activities would not result in substantial damage to ocean and coastal habitats that might constitute marine mammal habitat. We do not anticipate that the survey operations would physically alter the marine environment or negatively impact the physical environment in the proposed action area. The applicant's activities would minimally and briefly impact physical habitat features, such as substrates and/or water quality due to vibracoring and test drilling. These impacts from vibracoring are short, as they occur for approximately 90 seconds in 55 locations across the survey area.

The potential direct habitat impact by the Bluecrest drilling operation is limited to the actual drill-rig footprint defined as the area occupied and enclosed by the drill-rig legs. The jack-up rig would temporarily disturb one offshore location in lower Cook Inlet, where the well is proposed to be drilled. Bottom disturbance would occur in the area where the three legs of the rig would be set down and where the actual well would be drilled. The jack-up drill rig footprint would occupy three steel piles at 14 m (46 ft) diameter. The well casing would be a 76 cm (30 in) diameter pipe extending from the seafloor to the rig floor. The casing would only be in place during drilling activities at the well location. The total area of disturbance was calculated as 0.54 acres, which represents a very small fraction of the 7,300 square mile Cook Inlet surface area. Potential damage to the Cook Inlet benthic community would be limited to the actual surface area of the three spud cans (1,585 square feet each or 4,755 square feet total) that form the "foot" of each leg. Given the high tidal energy at the well site locations, drilling footprints are not expected to support benthic communities equivalent to shallow lower energy sites found in nearshore waters where harbor seals mostly feed.

Twelve effluents are authorized for discharge into Cook Inlet, including: drilling fluids and drill cuttings, deck drainage, sanitary waste, domestic waste, blowout preventer fluid, boiler blow down, fire control system test water, uncontaminated ballast water, bilge water, excess cement slurry, mud cuttings cement at sea floor, and completion fluids. Areas prohibited from discharge in the Cook Inlet are 10-meter (33-foot) isobaths, 5-meter (16-foot) isobaths, and other geographic area restrictions (AKG-31-5021.I.C.).

Drilling wastes include drilling fluids, known as mud, rock cuttings, and formation waters. Drilling wastes (non-hydrocarbon) would be discharged to the Cook Inlet under the approved Alaska Pollutant Discharge Elimination System (APDES) general permit. Drilling wastes (hydrocarbon) would be delivered to an onshore permitted location for disposal. Bluecrest would follow best management practices to ensure that a sufficient inventory of barite and lost circulation materials are maintained on the drilling vessel to minimize the possibility of a well upset and the likelihood of a release of pollutants to Cook Inlet waters. Bluecrest plans to conduct an Environmental Monitoring Study of relevant hydrographic, sediment hydrocarbon, and heavy metal data from surveys conducted before and during drilling mud disposal and up to a least one year after drilling operations cease in accordance with the APDES general permit for discharges of drilling muds and cuttings. No hazardous wastes should be generated as a result of this project. However, if any hazardous wastes were generated, they would be temporarily stored in an onboard satellite accumulation area and then transported offsite for disposal at an approved facility.

With oil and gas platforms presently operating in Cook Inlet, there is concern for continuous exposure to potentially toxic heavy metals and metalloids (i.e., mercury, lead, cadmium, copper, zinc, and arsenic) that are associated with oil and gas development and production. These elements occur naturally in the earths' crust and the oceans but many also have anthropogenic origins from local sources of pollution or from contamination from atmospheric distribution. Discharging drill cuttings or other liquid waste streams generated by the drilling vessel could potentially affect marine mammal habitat. Toxins could persist in the water column, which could have an impact on marine mammal prey species. However, despite a considerable amount of investment in research on exposures of marine mammals to organochlorines or other toxins, there have been no marine mammal deaths in the wild that can be conclusively linked to the direct exposure to such substances (O'Shea, 1999). Drilling muds and cuttings discharged to the seafloor can lead to localized increased turbidity and increase in background concentrations of barium and occasionally other metals in sediments and may affect lower trophic organisms. Effects on benthic communities are nearly always restricted to a zone within about 328 to 492 ft (100 to 150 m) of the discharge, where cuttings accumulations are greatest. Discharges and drill cuttings could impact fish by displacing them from the affected area. Because of the limited discharges no water quality impacts are anticipated that would negatively affect habitat for Cook Inlet marine mammals.

NMFS has established critical habitat for both the western distinct population segment of Steller sea lions and Cook Inlet beluga whales (described in section 3.1.1 of this EA). The proposed surveys would not occur in locations designated as critical habitat for Steller sea lions, so there would be no effect. A portion of EMALL and SAE's proposed surveying in Lower Cook Inlet is in Critical Habitat Area 2 and activities are also proposed for Critical Habitat Area 1. The primary impacts are acoustic in nature, which would not result in permanent alteration of any critical habitat. Additionally, mitigation measures would be required in the Authorizations, if issued, to reduce activity near Critical Habitat Area 1 when beluga whales are present in high numbers. Therefore, impacts to marine mammal habitat would be minimal. More information on potential impacts to marine mammal habitat is contained in EMALL, BlueCrest, and SAE's applications (EMALL, 2015; Owl Ridge, 2015), the Biological Assessments, and our Federal *Register* notice of the proposed EMALL IHA, which are incorporated herein by reference.

### 4.1.2. Impacts to Marine Mammals

We expect that disturbance from acoustic stimuli associated with the proposed programs have the potential to impact marine mammals. Acoustic stimuli generated by airguns and sub-bottom profilers may affect marine mammals in one or more of the following ways: tolerance, masking of natural sounds,

behavioral disturbance, or non-auditory physical effects (Richardson et al. 1995a). Our proposed EMALL IHA notice and EMALL, SAE, and BlueCrest's applications provide detailed descriptions of these potential effects of the proposed survey on marine mammals. That information is incorporated herein by reference and summarized next.

Numerous studies have shown that underwater sounds from industry activities are often readily detectable by marine mammals in the water at distances of many kilometers. Numerous studies have also shown that marine mammals at distances more than a few kilometers away often show no apparent response to industry activities of various types (Miller et al., 2005; Bain and Williams, 2006). This is often true even in cases when the sounds must be readily audible to the animals based on measured received levels and the hearing sensitivity of that mammal group. Although various baleen whales, toothed whales, and (less frequently) pinnipeds have been shown to react behaviorally to underwater sound such as airgun pulses or vessels under some conditions, at other times mammals of all three types have shown no overt reactions (e.g., Malme et al., 1986; Richardson et al., 1995a,b; Madsen and Mohl, 2000; Croll et al., 2001; Jacobs and Terhune, 2002; Madsen et al., 2002; Miller et al., 2005).

Masking is the obscuring of sounds of interest by other sounds, often at similar frequencies. Marine mammals are highly dependent on sound, and their ability to recognize sound signals amid other noise is important in communication, predator and prey detection, and, in the case of toothed whales, echolocation. Although some degree of masking is inevitable when high levels of manmade broadband sounds are introduced into the sea, marine mammals have evolved systems and behavior that function to reduce the impacts of masking. Structured signals, such as the echolocation click sequences of small toothed whales, may be readily detected even in the presence of strong background noise because their frequency content and temporal features usually differ strongly from those of the background noise (Au and Moore, 1988, 1990). The components of background noise that are similar in frequency to the sound signal in question primarily determine the degree of masking of that signal.

Masking effects of underwater sounds from EMALL, SAE, and BlueCrest's proposed activities on marine mammal calls and other natural sounds are expected to be limited. For example, beluga whales primarily use high-frequency sounds to communicate and locate prey; therefore, masking by low-frequency sounds associated with survey activities is not expected to occur (Gales, 1982). There is evidence of other marine mammal species continuing to call in the presence of industrial activity. Annual acoustical monitoring near BP's Northstar production facility during the fall bowhead migration westward through the Beaufort Sea has recorded thousands of calls each year (for examples, see Richardson et al., 2007; Aerts and Richardson, 2008). Construction, maintenance, and operational activities have been occurring from this facility for over 10 years. To compensate and reduce masking, some mysticetes may alter the frequencies of their communication sounds (Richardson et al., 1995a; Parks et al., 2007).

There is little concern regarding masking from the airgun in this case due to the brief duration of these pulses and relatively longer silence between airgun shots (9 – 12 seconds) near the sound source. Therefore, masking effects are anticipated to be limited, especially in the case of odontocetes, given that they typically communicate at frequencies higher than that of the airgun. Both the chirper and boomer sub-bottom profilers produce impulsive sound exceeding 160 dB re 1 μPa-m (rms). Marine mammal communications would not likely be masked appreciably by the profiler's signals given the directionality of the signal and the brief period when an individual mammal is likely to be within its beam.

Furthermore, despite the fact that the profiler overlaps with hearing ranges of many marine mammal species in the area, the profiler's signals do not overlap with the predominant frequencies in the calls, which would avoid significant masking. The sounds generated by the proposed equipment for the exploratory drilling program will consist of low frequency sources (most under 500 Hz). Lower frequency man-made sounds are more likely to affect detection of communication calls and other potentially important natural sounds such as surf and prey noise. There is little concern regarding masking near the jack-up rig during exploratory drilling operations, as the species most likely to be found in the vicinity are mid- to high-frequency cetaceans or pinnipeds with low-frequency cetaceans occurring less frequently.

Marine mammals may behaviorally react to sound when exposed to anthropogenic noise. These behavioral reactions are often shown as: changing durations of surfacing and dives, number of blows per surfacing, or moving direction and/or speed; reduced/increased vocal activities; changing/cessation of certain behavioral activities (such as socializing or feeding); visible startle response or aggressive behavior (such as tail/fluke slapping or jaw clapping); avoidance of areas where noise sources are located; and/or flight responses (e.g., pinnipeds flushing into water from haul-outs or rookeries). The onset of behavioral disturbance from anthropogenic noise depends on both external factors (characteristics of noise sources and their paths) and the receiving animals (hearing, motivation, experience, demography) and is also difficult to predict (Richardson et al. 1995a; Southall et al. 2007).

Little systematic information is available about reactions of beluga whales, killer whales, and harbor porpoise to noise pulses. In general, small toothed whales more often tend to head away, or to maintain a somewhat greater distance from the vessel, when a large airgun array is operating (e.g., Stone and Tasker 2006; Weir 2008; Barry et al. 2010). Beluga whales exhibit changes in behavior when exposed to strong, pulsed sounds similar in duration to those typically used in seismic surveys (Finneran et al. 2000, 2002). However, the animals tolerated high received levels of sound (peak–peak level >200 dB re 1 μPa) before exhibiting aversive behaviors (Richardson et al. 1995b). Whales are often reported to show no overt reactions to pulses from large arrays of airguns at distances beyond a few kilometers, even though the airgun pulses remain well above ambient noise levels out to much greater distances (Miller et al. 2005).

While there are no published data on seismic and sub-bottom profiler effects on sea lions or harbor seals, anecdotal data and data on arctic seals suggest that sea lions and other pinnipeds generally tolerate strong noise pulses due to the similarity in anatomy and physiology (Richardson et al. 1995a). Monitoring studies in the Alaskan and Canadian Beaufort Sea during 1996–2002 provided considerable information regarding behavior of arctic seals exposed to seismic pulses (Miller et al. 2005; Harris et al. 2001; Moulton and Lawson 2002). These seismic projects generally were much equivalent in size to that of SAE and much larger than airgun use proposed for the other activities considered in this EA. The combined results suggest that some seals avoid the immediate area around seismic vessels. Reactions are expected to be very localized and confined to relatively small distances and durations, with no long-term effects on individuals or populations.

Chorney et al. (2011) conducted sound measurements on an operating vibracorer in Alaska and found that it emitted a sound pressure level at 1-m source of 187.4 dB re 1 μPa-m (rms), with a frequency range of between 10 Hz and 20 kHz (Table 2). Vibracoring will result in the largest zone of influence (ZOI; area ensonified by sound energy greater than the 120 dB threshold) among the continuous sound sources.

Table 5 outlines our current acoustic thresholds for estimating marine mammal harassment, and Tables 5 through 7 outline the various radii for the proposed sound sources for use during the three activities proposed.

**Table 5Current acoustic exposure criteria used by NMFS.**

| Criterion | Criterion Definition | Threshold |
|---|---|---|
| Level A Harassment (Injury) | Permanent Threshold Shift (PTS) (Any level above that which is known to cause TTS) | 180 dB re 1 microPa-m (cetaceans) / 190 dB re 1 microPa-m (pinnipeds) root mean square (rms) |
| Level B Harassment | Behavioral Disruption (for impulse noises) | 160 dB re 1 microPa-m (rms) |
| Level B Harassment | Behavioral Disruption (for continuous noise) | 120 dB re 1 microPa-m (rms) |

**Table 6. Distances to Level B harassment sound level thresholds for EMALL**

| Survey Equipment | Distance to 160/120 dB Isopleth [1] km | 160/120 dB ZOI km² |
|---|---|---|
| Sub-bottom Profiler (Chirp) | 0.631 | 127 |
| Sub-bottom Profiler (Boomer) | 1.00 | 203 |
| Airgun | 0.3 | 60 |
| Vibracore | 20.57 | 1328.61 |

**Table 7. Distances to Level A and B harassment sound level thresholds for SAE**

| Array (cubic inch) | Water Depth | 190 dB radius (m) | 180 dB radius (m) | 160 dB radius (km) |
|---|---|---|---|---|
| 440 | Very Shallow | 50 | 182 | 3.05 |
| 1,760 | Shallow | 830 | 1,530 | 4.27 |
| 1,760 | Deep | 880 | 1,840 | 6.83 |

**Table 8. Distances to Level B harassment sound level thresholds for BlueCrest**

| | 190 dB radius | 180 dB radius | 160 dB radius | 120 dB radius |
|---|---|---|---|---|
| **Impact hammer during conductor pipe driving** | 60 m (200 ft) | 250 m (820 ft) | 1.6 km (1 mi) | NA |
| **Airguns during VSP** | 120 m (394 ft) | 240 m (787 ft) | 2.5 km (1.55 mi) | NA |
| **Rig tow** | NA | NA | NA | 600 m (2,000 ft) |
| **Deep well pumps on the jack-up rig** | NA | NA | NA | 260 m (853 ft) |

In summary, we interpret these effects on all marine mammals as falling within the MMPA definition of Level B (behavioral) harassment. We expect these impacts to be minor because we do not anticipate measurable changes to the population or impacts to rookeries, mating grounds, and other areas of similar significance.

Under the Preferred Alternative, we would authorize incidental take, by Level B harassment only, of four to nine species of marine mammals, depending upon the proposed activity. We expect no long-term or substantial adverse effects on marine mammals, their habitats, or their role in the environment. We base our conclusion on the available science and results of previous monitoring reports submitted by previous Cook Inlet IHA holders for similar surveys using equipment with larger source levels.

EMALL, SAE, and BlueCrest proposed a number of monitoring and mitigation measures for marine mammals, and we included some additional mitigation measures not proposed by applicants, as part of our evaluation for the Preferred Alternative. In consideration of the potential effects of the proposed survey, we determined that the mitigation and monitoring measures described in Section 2.3. of this Draft EA would be appropriate for the preferred alternative to meet the Purpose and Need.

**Injury:** None of the applicants requested authorization to take marine mammals by injury (Level A harassment), serious injury, or mortality. Based on the results of our analyses, applicants' environmental analyses, and previous monitoring reports for similar activities, there is no evidence that the planned activities are likely to result in injury, serious injury, or mortality within the action area when the mitigation and related monitoring measures are taken into account. The mitigation and monitoring measures are described in Section 2.3.1 of this EA.

**Vessel Strikes:** The potential for striking marine mammals is a concern with vessel traffic. However, it is highly unlikely that any vessel involved with any of the three IHA applicants' activities would strike a marine mammal. Studies show a direct relationship between ship speed and the probability of a ship strike resulting in an injury or mortality of an animal. Typical vessel speeds of the source vessels for the subject activities while collecting seismic or geophysical data is between 4-5 knots. Ship speeds when towing a large drill rig are also very slow. Moreover, mitigation measures would be required of all applicants to reduce speed or alter course if collisions with marine mammals appear likely, with required observers to monitor for marine mammals.

**Entanglement:** Although some of EMALL and SAE's equipment contains cables or lines, the risk of entanglement is extremely remote. Additionally, mortality from entanglement is not anticipated. The material used by EMALL and SAE as well as the amount of slack is not anticipated to allow for marine mammal entanglements.

**Estimated Take of Marine Mammals by Level B Incidental Harassment:** For purposes of evaluating the potential significance of the "takes" by harassment, estimations of the number of potential takes are discussed in terms of the populations present. The specific number of takes considered for the authorizations is developed via the MMPA process, and the analysis in this Draft EA provides a summary of the anticipated numbers that would be authorized to give a relative sense of the nature of impact of NMFS' proposed action. The methods to estimate take by harassment that may occur during EMALL, SAE, and BlueCrest's proposed activities are described in detail in the applicants' IHA applications and

will be presented in the Federal Register notices of proposed IHAs, which can be accessed at NMFS website at: http://www.nmfs.noaa.gov/pr/permits/incidental/oilgas.htm.

Estimates of the takes of marine mammals Levels B harassment from EMALL's proposed geophysical survey, SAE's 3D seismic survey, and BlueCrest's test drilling activities are presented in Tables 9 through 11. Calculated take is the number generated my multiplying daily ensonified area by the number of days of an activity and the density of a species, absent mitigation measures or other requirements and limiting factors. Take proposed is the amount of take by harassment NMFS is proposing to authorize in its IHA. Detailed descriptions of take estimates are presented in the Federal Register notices for the proposed IHAs for these actions.

**Table 9. The Level B harassments calculated and proposed to be authorized for EMALL.**

| Species | Calculated Take | Take Authorization Proposed |
|---|---|---|
| **Beluga whale** | **452** | **34** |
| **Killer whale** | **79** | **13** |
| **Harbor porpoise** | **316** | **54** |
| **Harbor seal** | **27153** | **4643** |

**Table 10. The Level B harassments calculated and proposed to be authorized for SAE.**

| Species | Calculated Take | Take Authorization Proposed |
|---|---|---|
| **Humpback whale** | **38** | **50** |
| **Gray whale** | **3** | **25** |
| **Minke whale** | **<1** | **25** |
| **Beluga whale** | **-** | **30** |
| **Killer whale** | **51** | **55** |
| **Dall's porpoise** | **6** | **25** |
| **Harbor porpoise** | **269** | **300** |
| **Harbor seal** | **17721** | **5725** |
| **Steller sea lion** | **291** | **300** |

**Table 11. The Level B harassments calculated and proposed to be authorized for BlueCrest.**

| Species | Calculated Take | Take Authorization Proposed |
|---|---|---|
| **Humpback whale** | **0.4** | **5** |
| **Beluga whale** | **0.3** | **5** |
| **Killer whale** | **0.3** | **5** |
| **Harbor porpoise** | **1.4** | **15** |
| **Harbor seal** | **93.5** | **25** |
| **Steller sea lion** | **3** | **15** |

### 4.1.3. Impacts on Subsistence

Under the Alternative 1 (the Preferred Alternative), EMALL, SAE, and BlueCrest's activities in Cook Inlet are expected to have minor and temporary effects on subsistence wildlife and marine mammals in the area. Sound from the proposed activity might temporarily displace wildlife from the area, but animals

are expected to return to the area following the cessation of use of sound sources for which an Authorization is proposed during survey activities.

Residents of the Native Village of Tyonek are the primary marine mammal subsistence users in Knik Arm area. However, due to dramatic declines in the Cook Inlet beluga whale population, on May 21, 1999, legislation was passed to temporarily prohibit (until October 1, 2000) the taking of Cook Inlet belugas under the subsistence harvest exemption in section 101(b) of the MMPA without a cooperative agreement between NMFS and the affected Alaska Native Organizations (ANOs) (Public Law No. 106-31, section 3022, 113 Stat. 57,100).. That prohibition was extended indefinitely on December 21, 2000 (Public Law No. 106-553, section 1(a)(2), 114 Stat. 2762). NMFS subsequently entered into six annual co-management agreements (2000-2003, 2005-2006) with the Cook Inlet Marine Mammal Council, an ANO representing Cook Inlet beluga hunters, which allowed for the harvest of 1-2 belugas. On October 15, 2008, NMFS published a final rule that established long-term harvest limits on the Cook Inlet beluga whales that may be taken by Alaska Natives for subsistence purposes (73 FR 60976). That rule prohibits harvest for a five-year period (2008-2012), if the average abundance for the Cook Inlet beluga whales from the prior five years (2003-2007) is below 350 whales. The current five-year period that could have allowed for a harvest (2013-2017), would have required the previous five-year average (2008-2012) to be above 350 whales, which it was not. Tyonek Natives occasionally harvest harbor seals, but their primary source of red meat is moose.

Data on the harvest of other marine mammals in Cook Inlet are lacking. The only data available for subsistence harvest of harbor seals, harbor porpoises, and killer whales in Alaska are in the marine mammal stock assessments. However, these numbers are for the entire Gulf of Alaska not just Cook Inlet, and they are not indicative of the harvest in Cook Inlet. Because of the relatively small proportion of marine mammals occurring in Cook Inlet, the number harvested is expected to be extremely low. For example, there is a low level of subsistence hunting for harbor seals in Cook Inlet. Seal hunting occurs opportunistically among Alaska Natives who may be fishing or travelling in the upper Inlet near the mouths of the Susitna River, Beluga River, and Little Susitna River (B. Smith, NMFS, pers. comm.).

EMALL, SAE, and BlueCrest concluded, and NMFS agrees, that the size of the affected area, mitigation measures, and input from the consultations from Alaska Natives should result in the proposed action, and the underlying survey activities, having no unmitigable adverse impact on the availability of marine mammals for subsistence uses. EMALL, SAE, BlueCrest, and NMFS recognize the importance of ensuring that Alaska Native Organizations and federally recognized tribes are informed, engaged, and involved during the permitting process and will continue to work with the ANOs and tribes to discuss their operations and activities.

NMFS anticipates that any effects from EMALL, SAE, and BlueCrest's proposed activities on marine mammals, especially harbor seals and Cook Inlet beluga whales, which are or have been taken for subsistence uses, would be short-term, site specific, and limited to inconsequential changes in behavior and mild stress responses. NMFS does not anticipate that the authorized taking of affected species or stocks would reduce the availability of the species to a level insufficient for a harvest to meet subsistence needs by: (1) Causing the marine mammals to abandon or avoid hunting areas; (2) directly displacing subsistence users; or (3) placing physical barriers between the marine mammals and the subsistence

hunters; and that cannot be sufficiently mitigated by other measures to increase the availability of marine mammals to allow subsistence needs to be met.

### 4.2. Effects of Alternative 2 – No Action Alternative

Under the No Action Alternative, we would not issue Authorizations to EMALL, SAE, or BlueCrest. The applicant would not receive an exemption from the MMPA and ESA prohibitions against take and if we assume they would not perform their activities (to avoid the risk of violating the MMPA or ESA), there would be no effect on the environment. If the applicants chose to go forward with their activity, they may voluntarily adopt the mitigation measures included in their application, which would result in the same impacts as Alternative 1. However, because adoption of those measures would be voluntary, there is a risk that not all measures would be adopted or properly implemented and NMFS would not know the extent and severity of any resulting take. The incidental take of marine mammals, including those listed as threatened or endangered, resulting from EMALL, SAE, or BlueCrest's activities would not be exempted.

### 4.3. Unavoidable Adverse Impacts

EMALL, SAE, and BlueCrest's applications, our *Federal Register* notices of the proposed IHAs, and other environmental analyses identified unavoidable adverse impacts to marine mammals or the populations to which they belong or on their habitats, as well as subsistence uses of marine mammals, occurring in the proposed survey area. We incorporate those documents by reference.

We acknowledge that the incidental take proposed to be authorized would potentially result in some level of unavoidable adverse impacts including behavioral disturbance, masking, and non-auditory effects to marine mammals. However, we expect that the numbers of individuals of each species or stock taken by harassment would be small (relative to species or stock abundance), that the proposed survey and the take resulting from the survey activities would have a negligible impact on the affected species or stocks of marine mammals, and that there would not be an unmitigable adverse impact to subsistence uses of marine mammals in Cook Inlet.

### 4.4. Cumulative Effects

NEPA defines cumulative effects as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR §1508.7). Cumulative impacts can result from individually minor but collectively significant actions that take place over a period of time.

The Cook Inlet region is a major population center in the State of Alaska and supports a wide range of activities. The proposed surveys would add more, albeit temporary, industrial activity to Cook Inlet. These activities would be limited to a portion of the Inlet, and there would be no objects or materials permanently released into the water column. This section provides a brief summary of the human-related activities affecting the marine mammal species in the action area.

#### 4.4.1. Subsistence Hunting

In Cook Inlet, Native hunters historically have hunted beluga whales and harbor seals for food. The subsistence harvest of beluga transcends nutritional and economic value of the whale as the harvest is an integral part of the cultural identity of the region's Alaska Native communities. Inedible parts of the

whale provide Native artisans with materials for cultural handicrafts, and the hunting perpetuates Native traditions by transmitting traditional skills and knowledge to younger generations. However, due to dramatic declines in the Cook Inlet beluga whale population, on May 21, 1999, legislation was passed to temporarily prohibit (until October 1, 2000) the taking of Cook Inlet belugas under the subsistence harvest exemption in section 101(b) of the MMPA without a cooperative agreement between NMFS and the affected ANOs (Public Law No. 106-31, section 3022, 113 Stat. 57,100). That prohibition was extended indefinitely on December 21, 2000 (Public Law No. 106-553, section 1(a)(2), 114 Stat. 2762). NMFS subsequently entered into six annual co-management agreements (2000-2003, 2005-2006) with the Cook Inlet Marine Mammal Council, an ANO representing Cook Inlet beluga hunters, which allowed for the harvest of 1-2 belugas.

On October 15, 2008, NMFS published a final rule that established long-term harvest limits on Cook Inlet beluga whales that may be taken by Alaska Natives for subsistence purposes (73 FR 60976). That rule prohibits harvest for a 5-year interval period if the average stock abundance of Cook Inlet beluga whales over the prior five-year interval is below 350 whales. Harvest levels for the current 5-year planning interval (2013-2017) are zero because the average stock abundance for the previous five-year period (2008-2012) was below 350 whales. Based on the average abundance over the 2002-2007 period, no hunt occurred between 2008 and 2012 (NMFS, 2008a). The Cook Inlet Marine Mammal Council, which managed the Alaska Native Subsistence fishery with NMFS, was disbanded by a unanimous vote of the Tribes' representatives on June 20, 2012. No harvest occurred in 2015 or is expected in 2016. Additional information on the Cook Inlet beluga harvest can be found in NMFS (2008a).

There is a low level of subsistence hunting for harbor seals in Cook Inlet. Seal hunting occurs opportunistically among Alaska Natives who may be fishing or travelling in the upper Inlet near the mouths of the Susitna River, Beluga River, and Little Susitna. Some detailed information on the subsistence harvest of harbor seals is available from past studies conducted by the Alaska Department of Fish & Game (Wolfe et al., 2009). In 2008, 33 harbor seals were taken for harvest in the Upper Kenai-Cook Inlet area. In the same study, reports from hunters stated that harbor seal populations in the area were increasing (28.6%) or remaining stable (71.4%). The specific hunting regions identified were Anchorage, Homer, Kenai, and Tyonek, and hunting generally peaks in March, September, and November (Wolfe et al., 2009). The timing and location of subsistence harvest of Cook Inlet harbor seals may coincide with EMALL and SAE's projects, but because this subsistence hunt is conducted opportunistically and at such a low level (NMFS, 2013c), EMALL, SAE, and BlueCrest's programs are not expected to have an impact on the subsistence use of harbor seals.

### 4.4.2. Pollution

As the population in urban areas continue to grow, an increase in amount of pollutants that enter Cook Inlet is likely to occur. Sources of pollutants in urban areas include runoff from streets and discharge from wastewater treatment facilities. Gas, oil, and coastal zone development projects (e.g., the Chuitna Coal Mine) also contribute to pollutants that enter Cook Inlet through discharge. Gas, oil, and coastal zone development will continue to take place in Cook Inlet; therefore, it would be expected that pollutants could increase in Cook Inlet. However, the EPA and the ADEC will continue to regulate the amount of pollutants that enter Cook Inlet from point and non-point sources through NPDES permits. As a result, permittees will be required to renew their permits, verify they meet permit standards and potentially

upgrade facilities. Additionally, the extreme tides and strong currents in Cook Inlet may contribute in reducing the amount of pollutants found in the Inlet.

### 4.4.3. Fisheries Interaction

Fishing is a major industry in Alaska. As long as fish stocks are sustainable, subsistence, personal use, recreational and commercial fishing will continue to take place in Cook Inlet. As a result there will be continued prey competition, risk of ship strikes, potential harassment, potential for entanglement in fishing gear and potential displacement from important foraging habitat for the Cook Inlet beluga whales. NMFS and the ADF&G will continue to manage fish stocks and monitor and regulate fishing in Cook Inlet to maintain sustainable stocks.

### 4.4.4. Vessel Traffic

Major contributors to vessel traffic throughout Cook Inlet include port facilities, oil and gas development, and commercial and recreational fishing. The Port of Anchorage (POA) is a major Alaskan port located adjacent to Anchorage in upper Cook Inlet. While the POA is outside the action area considered in this EA, the POA yields a high volume of vessels traffic that must pass through or near the action area described in this EA. The POA provides 90 percent of the consumer goods for 85 percent of the state of Alaska. The POA handles the majority of Alaska's refined petroleum products and the bulk of jet fuel for Joint Base Elmendorf-Richardson and the Ted Stevens Anchorage International Airport (100 and 60 percent respectively; POA, 2014). Major vessels calling to the POA include cargo ships, barges, tankers, dredgers, military ships and tug boats (POA, 2009). Based on data from 1998-2011, an average of approximately 450 vessels call to the POA annually (POA, 2014). The POA is currently under construction and expanding its facilities. As a result, vessel traffic will increase once the project is complete.

Port MacKenzie is located in upper Cook Inlet and also contributes to vessel traffic that passes through or near the EA action area. It receives about two large ships annually (i.e. a landing craft and/or a barge), which is substantially less than the POA. However, the number of ships calling to port at Port MacKenzie is expected to increase over the next five years; the Rail Extension and expanding the currently existing deep draft dock are planned for construction. Smaller port facilities that contribute to vessel traffic in the action area include Nikiski, the City of Kenai, Kasilof, Ninilchik, Anchor River, Tyonek and Drift River. Vessels ranging from tankers to fishing boats call to these ports (Kenai Peninsula Borough, 2003). Gas and oil development also contribute to vessel traffic in the action area, as well as commercial and recreational fishing vessels.

### 4.4.5. Gas and Oil Development

Currently, there is one other known oil and gas development project in Cook Inlet that may receive an MMPA authorization for incidental take. Apache Alaska Corporation (Apache) petitioned for regulations to conduct seismic surveys in Cook Inlet for the next five years. This work is very similar to SAE's proposed survey with some spatial overlap and also temporal overlap. This survey is expected to cover much of the same area as SAE's current survey, but also contains many of the same mitigation measures to reduce impact to marine mammal species and their habitat. Apache proposed to use vessel-based, shore-based, as well as aerial observers, both during daytime seismic operations as well as during time without ongoing seismic. The same seasonal 10 mile buffer to beluga critical habitat from April 15 to October 15 applies to the Apache survey. Additionally, the Apache rulemaking contains an adaptive

management component that allows NMFS to change the mitigation and monitoring requirements depending on the effectiveness of the previous years of work. Additionally, NFMS is required to re-affirm its determinations under the MMPA before issuing the annual LOAs under the rulemaking, as another safety measure to ensure that impacts from this activity on the marine mammal populations in the area remain negligible. Impacts from gas and oil development include increased noise from seismic activity, vessel and air traffic and well drilling; discharge of wastewater; habitat loss from the construction of oil and gas facilities; and contaminated food sources and/or injury from a natural gas blowout or oil spill. The risk of these impacts may increase as oil and gas development increases; however, new development will undergo consultation and permitting requirements prior to exploration and development. NMFS does not expect to issue any additional MMPA Authorizations for incidental take related to oil and gas activities in Cook Inlet for 2016.

Support vessels are required for gas and oil development to transport supplies and products to and from the facilities. Not only will the support vessels from increased gas and oil development likely increase noise in the action area, there is a potential for a slightly increased risk of ship strikes with beluga whales; however, ship strikes have not been definitively confirmed in a Cook Inlet beluga whale death, and monitoring measures should reduce this risk by placing visual monitors on ships to look out for whales.

Of the activities being proposed, there is little spatial and temporal overlap. EMALL is proposing to operate geophysical equipment , largely in the upper Inlet outside of the Susitna exclusion zone effective dates, as well as at their marine terminal site, south of the Forelands and to the east of the Inlet. SAE is proposing to survey a vast expanse of the Inlet, given that their clients have not yet specific working areas, but NMFS is aware the actual area surveyed will be a small portion of what is proposed. Lastly, other than transit of the drill rig from the north to south of the Inlet, Bluecrest's activity is spatially far removed from that proposed by EMALL or SAE. The lack of spatial and temporal overlap in these activities should allow marine mammals in the area to continue to move throughout the Inlet without difficulty. Additionally, the most important feeding areas for Cook Inlet belugas, the Susitna Delta region, is closed to all of the proposed activities from April 15 to October 15 to ensure the belugas can use the area without interruption or impediment.

### 4.4.6. Coastal Zone Development

Coastal zone development may result in the loss of habitat, increased vessel traffic, increased pollutants and increased noise associated with construction and noise associated with the activities of the projects after construction. In the action area, two main projects are being considered, the Chuitna Coal Mine and the Ocean Renewable Power Company (ORPC) Tidal Energy Project.

***Chuitna Coal Project***

PacRim Coal, LP is proposing to develop, construct and operate a coal mine and export facility 19 km (12 mi) northwest of the Village of Tyonek. Potential impacts to marine mammals in upper Cook Inlet from the Chuitna Coal Project would include the construction of the coal export facility and surface water discharge. The coal export facility that includes an overland coal conveyer and ship loading berth would extend from shore into Cook Inlet. The conveyer and ship berth would incorporate tower sites approximately 335 m (1,100 ft) apart to allow for uninhibited movement of marine life (PacRim Coal, LP, 2011). No chemical or water-based processing of the coal would take place; therefore, the expected sources of discharge from the project would include rainfall, snowmelt and groundwater (PacRim Coal,

LP, 2011). Prior to discharging water into Cook Inlet, the water would be directed to sediment control structures and meet the water quality criteria described by the APDES permit (PacRim Coal, LP 2011).

***ORPC Alaska Tidal Energy Projects***

The ORPC is proposing two tidal energy projects in Cook Inlet. The first tidal energy project would be located on the Westside of Fire Island near Anchorage, and the second project would be located adjacent to the East Foreland in the vicinity of Nikiski on the Kenai Peninsula (ORPC, 2011). The tidal energy projects would require the installation of an array of turbine generator units and transmission cables on the seafloor to harness the tidal energy. The tidal energy will be converted to electrical energy at stations on land. These projects are still in preliminary testing and environmental monitoring phases (ORPC, 2011).

### 4.4.7. Marine Mammal Research

Because many important aspects of marine mammal biology remain unknown, or are incompletely studied, and because management of these species and stocks requires knowledge of their distribution, abundance, migration, population, ecology, physiology, genetics, behavior, and health, free-ranging marine mammal species are frequently targeted for scientific research and studies. Research activities normally include close approach by vessel and aircraft for line-transect surveys; behavioral observation; photo-identification and photo-video-grammetry; passive acoustic recording; attachment of scientific instruments (tagging), both by implantable and suction cup tags; biopsy sampling, including skin and blubber biopsy and swabbing; land-based surveys; live capture for health assessments, and blood and tissue sampling, pinniped tooth extraction, and related pinniped anesthesia procedures. All researchers are required to obtain a scientific research permit from NMFS Office of Protected Resources under the MMPA and/or ESA (if an ESA-listed species is involved). Currently, the permits authorizing research on beluga whales in Cook Inlet, as wells as permits authorizing research on harbor seals, harbor porpoises, Steller sea lions, and killer whales in Alaskan waters may have cumulative effects on these species and stocks but are likely not significant. NMFS anticipates that scientific research on marine mammals in Cook Inlet will continue, and possibly expand, due to the increasing need to better understand distribution and abundance relative to temporal (seasonal, diel, or tidal) and spatial (geographic or bathymetric) parameters.

### 4.4.8. Climate Change

The 2007 Intergovernmental Panel on Climate Change concluded that there is very strong evidence for global warming and associated weather changes and that humans have "very likely" contributed to the problem through burning fossil fuels and adding other "greenhouse gases" to the atmosphere (IPCC, 2007). This study involved numerous models to predict changes in temperature, sea level, ice pack dynamics, and other parameters under a variety of future conditions, including different scenarios for how human populations respond to the implications of the study.

Evidence of climate change in the past few decades, commonly referred to as global warming, has accumulated from a variety of geophysical, biological, oceanographic, and atmospheric sources. The scientific evidence indicates that average air, land, and sea temperatures are increasing at an accelerating rate. Although climate changes have been documented over large areas of the world, the changes are not uniform and affect different areas in different ways and intensities. Arctic regions have experienced some of the largest changes, with major implications for the marine environment as well as for coastal

communities. Recent assessments of climate change, conducted by international teams of scientists (Gitay et al., 2002 for the Intergovernmental Panel on Climate Change; (IPCC) Arctic Climate Impact Assessment, 2004; IPCC, 2007), have reached several conclusions of consequence for this EA:

- Average arctic temperatures increased at almost twice the global average rate in the last 100 years.
- Satellite data since 1978 show that perennial arctic sea ice extent has shrunk by 2.7 percent per decade, with larger decreases in sea ice extent in summer of 7.4 percent per decade.
- Arctic sea ice thickness has declined by about 40 percent during the late summer and early autumn in the last three decades of the 20$^{th}$ century.

Marine mammals are classified as sentinel species because they are good indicators of environmental change. Arctic marine mammals are ideal indicator species for climate change, due to their circumpolar distribution and close association with ice formation. NMFS recognizes that warming of the Arctic, which results in the diminishing of ice, could be a cause for concern to marine mammals. In Cook Inlet, marine mammal distribution is dependent upon ice formation and prey availability, among other factors. For example, belugas often travel just along the ice pack and feed on prey beneath it (Richardson et al., 1990, 1991). Any loss of ice could result in prey distribution changes or loss; however, beluga whales do not use ice for resting, reproduction, or rearing of young like pinnipeds.

It is not clear how governments and individuals will respond or how much of these future efforts will reduce greenhouse gas emissions. Although the intensity of climate changes will depend on how quickly and deeply humanity responds, the models predict that the climate changes observed in the past 30 years will continue at the same or increasing rates for at least 20 years. Although NMFS recognizes that climate change is a concern for the sustainability of the entire ecosystem in Cook Inlet, it is unclear at this time the full extent to which climate change will affect marine mammal species.

#### 4.4.9. Conclusion

Based on the summation of activity in the area provided in this section, NMFS determined that the impact of issuing Authorizations for one year for the proposed EMALL, SAE, and BlueCrest activities in Cook Inlet would not be expected to result in a cumulative significant impact to the human environment when added to past, present, and future activities. The potential impacts to marine mammals, their habitats, and the human environment of issuing Authorizations are expected to be minimal based on the limited and temporary noise footprint and mitigation and monitoring requirements of the Authorizations.

## Chapter 5 List of Preparers and Agencies Consulted

### Agencies Consulted

No other persons or agencies were consulted in preparation of this EA.

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